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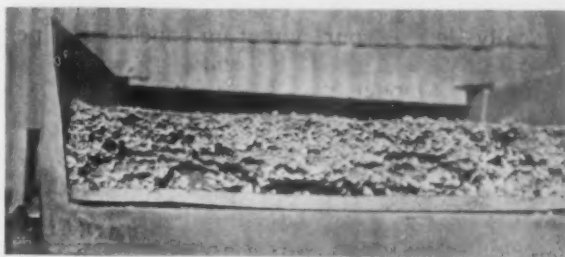
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Sintering Flue Dust at Mingo Junction

Utilizing Iron Bearing Material at a Time of Inadequate Deliveries of Ore — Automatic Skip Hoist to Eliminate Hand Labor

BY H. V. SCHIEFER*

A SINTERING plant has been recently put into operation at the Mingo Works of the Carnegie Steel Company which embodies all of the latest developments and improvements in machinery and equipment for the economical handling of flue dust and producing sinter. The number of workmen has been reduced to a minimum by the centralized system of electrical controls and interlocks arranged on the driving equipment, and also by the use of overhead storage bins which allows of handling in one shift all raw materials that are re-



Sinter Cake About to Be Discharged from Machine

quired to run the sintering machines for 24 hr. Also these overhead bins together with the ingenious and simple feeding devices have practically eliminated the serious segregation of the raw materials that was an ever-present difficulty in sintering plants of the old type in which ground storage

bins were employed.

The plant, which covers an area of about 36 x 75 ft., is located at the end of the ore stock pile and adjacent to the trestle that leads to the high line which serves the battery of blast furnaces. It is interesting to note a triangle of apparently waste

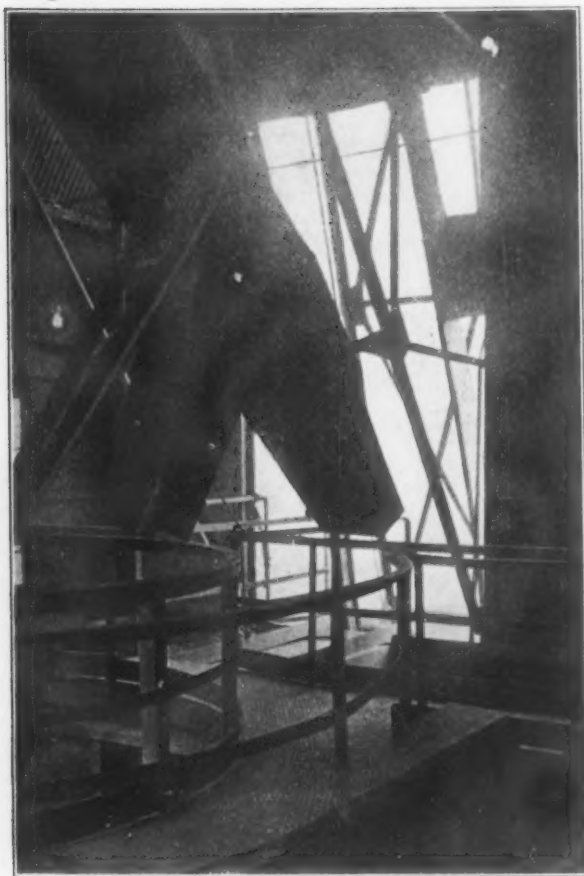
*Engineer, C. O. Bartlett & Snow Company, Cleveland.



Over Size Chute and Counterweight Runway Show Prominently; Proximity of Blast Furnace Is Shown



From Right to Left, Screen House, Skip Runway, Stack Building and Oversize Chute



The Swivel Spout Over the Bins. Safety details of handrails, toe boards, etc., may be noted

ground is always present at the end of nearly all blast-furnace stock piles and in this way not only does the sintering plant occupy waste ground but it is naturally located very near the blast furnaces in which the sinter is to be used.

The plant is designed for the handling of both stock pile and direct flue dust with a capacity of 300 tons of finished sinter per day. The arrangement of conveyors, storage bins, etc., is such that all direct flue dust can be sintered, all stock pile can be sintered, or a mixture of the two can be sintered in such proportions as the material and conditions indicate to be the best. These conditions are affected materially by the weather and seasons of the year. In winter the stock pile flue dust being frozen is of course a different material to handle than it is in summer when it is thoroughly dried out.

The raw flue dust is brought to the plant in hopper-bottom standard-gage railroad cars from which it is discharged into either one of two hoppers. A conveyor located under these hoppers delivers the material to a shaking screen. The fines, passing through this screen are delivered through a chute to a preliminary pug mill from whence they are chuted to an automatic skip hoist for delivery to the overhead storage bins. The coarse material that passes over the screen is mostly coke. This material drops into a bin which holds about a car load. When a full bin has accumulated it is chuted to the above mentioned skip hoist which elevates it and discharges into a chute that deposits the material into a railroad car. This oversize material is nearly all coke and is sent back to the blast furnace.

From the overhead storage bins the material is fed into two main pug mills by a set of revolving disk feeders. A swinging chute discharges the ma-

terial from the pug mills to the pallets of a Dwight & Lloyd sintering machine. The finished sinter passes over a screen into standard railroad cars. The fines passing through the screen are called returns. These are also discharged into railroad cars and returned again to go through the entire operation again.

To facilitate the operation of unloading and to eliminate switching as far as possible there are two unloading hoppers used, one under each track on the trestle. These hoppers are 14 x 14 ft. and are covered with a grillage of standard 7-in. I-beams placed 16 in. center to center. The purpose of this grillage is two-fold, first it prevents any excessively large pieces entering the system and second it affords a good footing for the men who are unloading the cars. The hoppers are made of steel plates and terminate at the bottom in chutes into which are fitted rack and pinion gates for controlling the flow of material to an inclined conveyor. This conveyor consists of a steel apron with double-beaded flights mounted on through axles 1 in. in diameter, and two strands of heavy drop-forged chains. The chain has a 12-in. pitch and is provided with self-oiling chilled face rollers. The conveyor runs at a constant slow speed, but the capacity may be varied through changing the depth of the material by operating the rack and pinion gates in the track hoppers. By means of a fly gate, the various materials coming from the apron conveyor may be sent over a shaking screen or by-passed around it. The conveyor is direct connected to a 7½-hp. Westinghouse motor running at 850 r.p.m.

The screen consists of two 4 x 8-ft. separate

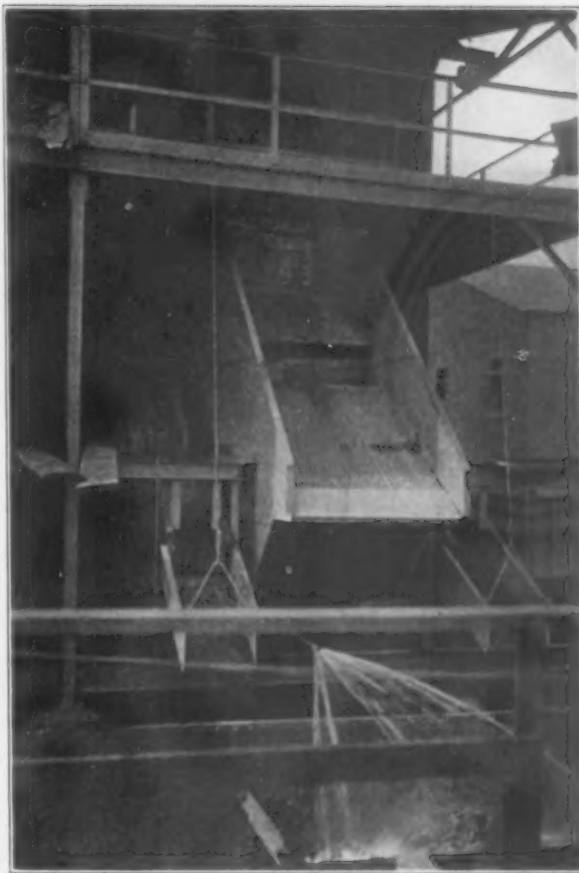


The Revolving Discs for Feeding from the Bins Are 60 In. in Diameter

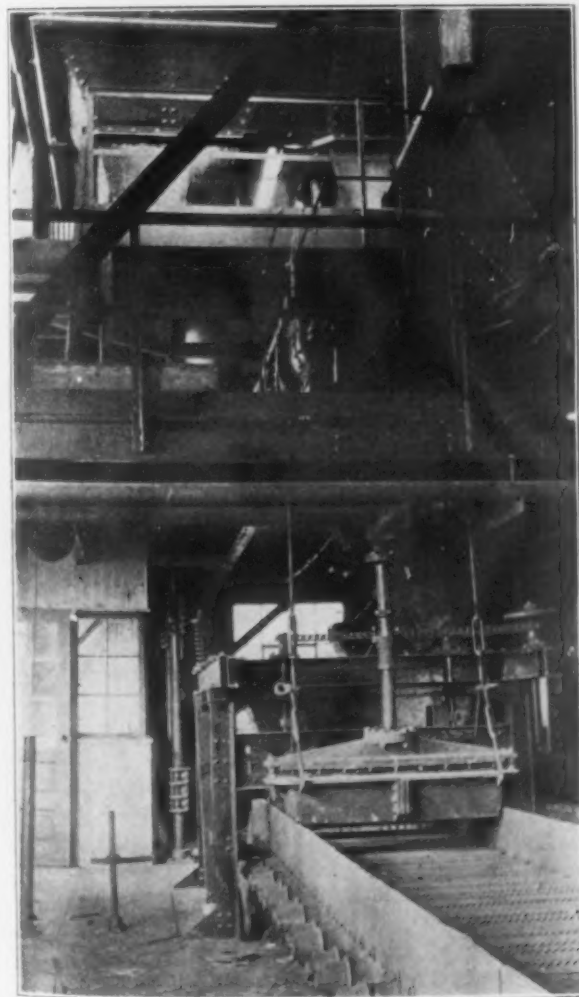
shaking screens, one fitting inside the end of the other in tandem formation. They are run in conjunction with a fly wheel and arranged so that when operating they counterbalance each other, relieving the building of vibration. Each screen is suspended from the frame of the screen house by four rods and is driven by two eccentrics. The stroke of the eccentrics is adjustable from $3\frac{1}{2}$ to 7 in. The hanger rods are fitted with turnbuckles which permit a variation in the slope of the screen. The screen is made of $\frac{1}{4}$ -in. plate crimped into steps $11\frac{1}{2}$ in. long and $1\frac{3}{4}$ in. high, being perforated with tapered slots $\frac{1}{4}$ in. wide at the upper end and $\frac{1}{2}$ -in. wide at the lower end. The screen is direct connected to a $7\frac{1}{2}$ -hp. variable-speed motor running at 850 to 1700 r.p.m. This motor is placed in a separate room to protect it from dust.

The material passing over this reciprocating screen falls into a large bin in which it is stored until a car load has accumulated. It is then elevated by means of an automatic skip hoist and discharged into a railroad car for removal. This material is mostly large lumps of coke and is sent back to be recharged into the blast furnaces as stated.

The material that passes through the screen may be extremely dry, especially when flue dust is received direct from the blast furnaces. The screen also is obliged to handle damp stock pile flue dust, sometimes containing 18 or 20 per cent moisture. The damp material is passed directly by gravity through a fly gate to the automatic skip hoist in which it is elevated to the overhead storage bins. Dry material is fed by gravity to a preliminary pug mill or mixer in which several fine sprays of water



An Observation Porch Is Directly Above the Sinter Screen. The sinter is cooled in the car



Empty Sintering Machine with Ignition Burner in Place Over the Pallets

are introduced. The material is tempered with about 2 per cent of moisture to allay the dust.

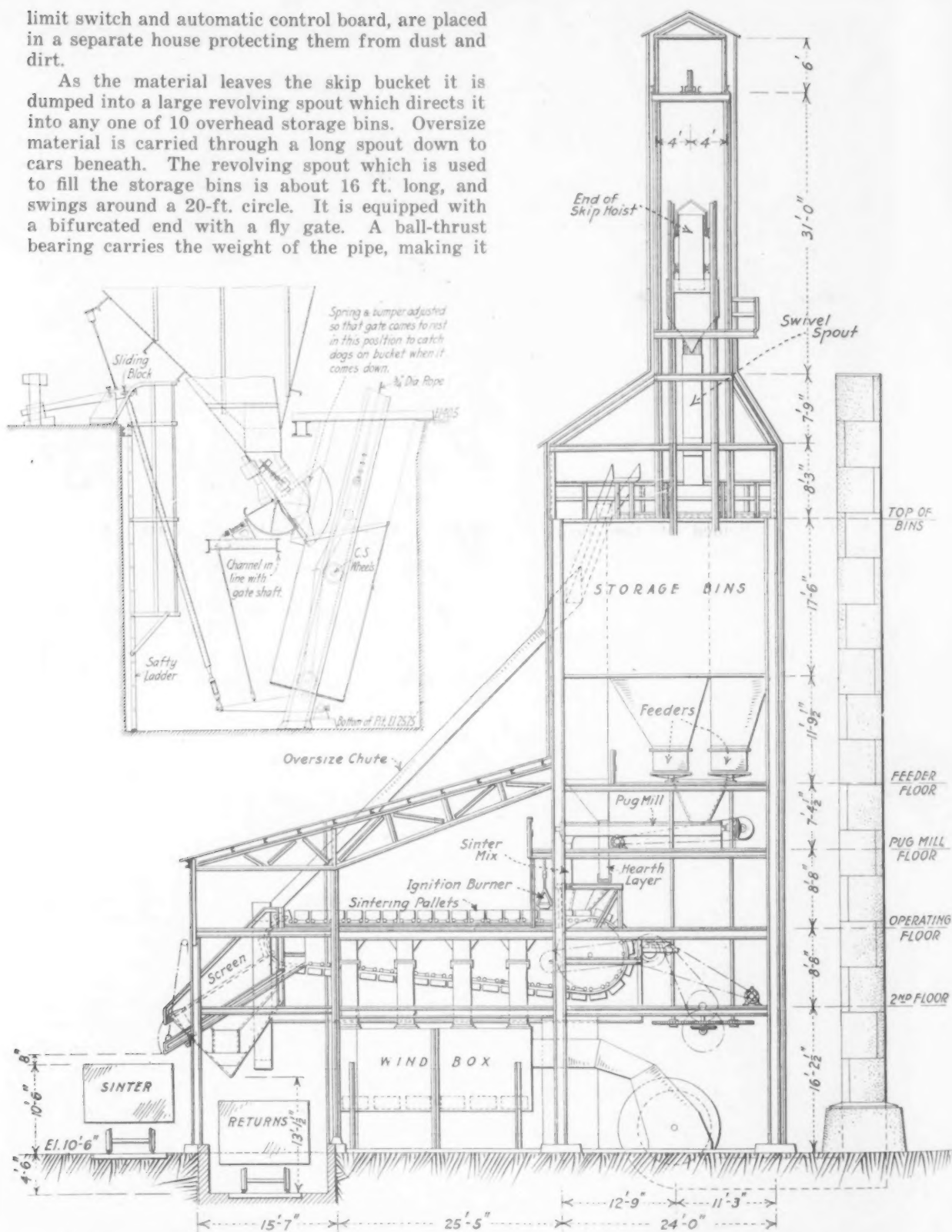
The preliminary pug mill is run only when direct flue dust is being handled. After passing through the preliminary pug mill the material falls by gravity to the skip hoist, used also for handling wet material, in which it is elevated to the overhead storage bins. It is driven by a $7\frac{1}{2}$ -hp. motor running at 850 r.p.m. The one automatic counterbalanced skip hoist used was designed and patented by the C. O. Bartlett & Snow Company.

When the skip bucket is in the lower position it comes to rest on a counterweighted lever, as shown in the detail drawing, and when sufficient weight of material is deposited in the bucket to trip this lever a latch is released which allows an undercut gate to be closed by counterweights. In closing, this gate operates an electric switch which admits current to the hoisting motor. The bucket, which starts up slowly, is automatically accelerated, and travels at full speed until it is within about 10 ft. of the top, where it slows down and comes to a stop in dumping position. By means of a dash-pot arrangement the bucket pauses several seconds to allow time for discharging. Then the motor automatically reverses, and the bucket descends. At the bottom it comes to rest on the counterweighted levers and automatically opens the gate in the chute leading from the feeding hopper, this completing a cycle of operations.

The hoisting engine consists of a 35-hp. compound-wound motor mounted on a structural-steel base. The motor is connected to a 24-in. winding drum through a train of cut gears enclosed in oil-tight cast-iron gear guards. The bucket is run in conjunction with a counterweight, as stated, this reducing to a minimum the peak loads on the line. The hoisting engine, together with the necessary

limit switch and automatic control board, are placed in a separate house protecting them from dust and dirt.

As the material leaves the skip bucket it is dumped into a large revolving spout which directs it into any one of 10 overhead storage bins. Oversize material is carried through a long spout down to cars beneath. The revolving spout which is used to fill the storage bins is about 16 ft. long, and swings around a 20-ft. circle. It is equipped with a bifurcated end with a fly gate. A ball-thrust bearing carries the weight of the pipe, making it



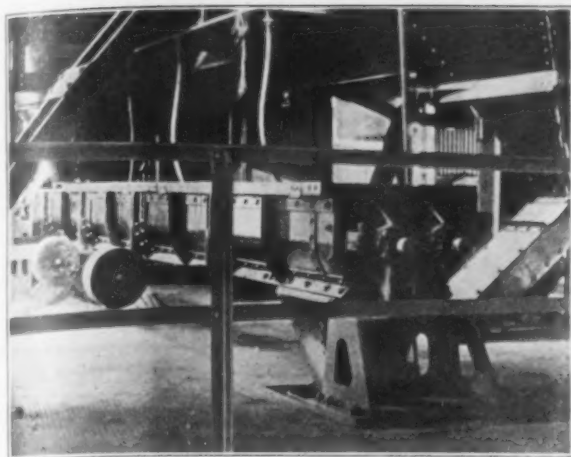
The skip bucket on descending opens the gate and when filled the weight of the contents operates the system of levers which close the gate and automatically start the skip hoisting machinery. The sectional elevation shows one of the two sintering equipments, which are side by side

easy for one man to manipulate it. A circular runway is provided, so that the operator may follow the spout around and lash it to the circular hand rail in the position desired.

Since the unloading, screening and elevating equipment was designed so that the handling and screening work might be completed in a single shift, it was necessary to provide ample storage capacity for a double shift of the sintering machines. Furthermore, the difficulties encountered in other installations where segregation of fine and coarse material had occurred suggested a design in which the

storage bins are elevated so as to mix the various materials immediately preceding their being placed on the pallets of the sintering machines.

To meet these requirements the 10 elevated bins were employed. The sizes were determined to provide a storage capacity of 1750 cu. ft. of limestone, 5720 cu. ft. of stock pile flue dust, 2860 cu. ft. of sinter returns, and 2000 cu. ft. of direct flue dust. The bottoms of the bins are sufficiently steep to eliminate the necessity of hand poking or agitation of any kind. The limestone bins taper down to chutes which lead directly to the hearth of the sin-



Pug Mill with Limestone Hopper and Chute at Extreme Right. The counterweights that hold the pug mill bottom in place show prominently

tering machines, and the bottoms of the other bins terminate in 4-ft. circular openings directly over revolving disk feeders.

From the point where the material leaves the storage bins the plant is divided into two complete units, each consisting of a pug mill, a sintering machine, fan and the necessary auxiliaries.

It is of the utmost importance that the materials be accurately and continuously proportioned as they are fed to the pug mill. The lumps in the mixture must be evenly distributed in the fines so as to insure an even layer of material on the hearth of the sintering machine. In this plant these conditions are met by employing eight feeders, which are essentially cylindrical vertical tubes under which circular disks revolve at 1 to 3 r.p.m.

The feeders are 4 ft. in diameter and 30 in. high. As the disks revolve the material is brought against a scraper, which directs it through a 7 x 9-in. opening in the side of the feeder. This opening is fitted with an adjustable sliding door so that the discharge of the material may be regulated. The disks revolve on roller bearings, and the driving power is transmitted to them through long vertical shafts which extend below the second floor to a nest of horizontal spur gears. The central gear is driven by a pair of bevel gears through a shaft belted to the drive of the sintering machines. The four secondary gears, which are fastened to the vertical shafts of the feeders, are arranged so that any one may be disengaged from the main drive by means of clutches operated by levers extending up to the operating floor.

The four revolving feeders feed the materials into a large steel funnel, which directs them into a long pug mill. The pug mill not only mixes the materials thoroughly but also mixes them with water to the proper consistency that is essential to the sintering on the hearth of the machines. The pug mill is a steel trough 15 ft. long, in which two square shafts revolve in opposite directions at 75 r.p.m. Manganese steel paddles are mounted on the shafts. A photograph of the pug mill is here shown. The paddles are constructed so that they may be easily removed and replaced, and the shafts may be removed without disturbing the bearings. The bottom is hinged, and may be dropped and cleaned while the mill is in operation.

Both pug mills are belt connected to a 15-h.p. motor. The pulley shaft is at right angles to the paddle shafts of the mill, and the transmission is effected by means of bevel gears.

The quality of the mixture as it is fed to the hearth of the sintering machines determines the

success of the sintering process. Careful attention was given to this requirement in designing the plant and as a result the pug mill and sintering machine in each unit were arranged in direct sequence. This allows control of the material which is being fed to the sintering machine and enables close regulation of the content of the mixture in the pug mill.

A swinging spout is employed to feed the materials upon the hearth of the sintering machine. The spout is pivoted on the discharge chute of the pug mill and by means of a rope and counterweight attached to a crank on a countershaft of the sintering machine, it is swung back and forth at right angles to the direction of travel of the machine. This method provides an even distribution of the sinter mixture on the moving hearth.

The sintering machine, which was furnished by the American Ore Reclamation Company, New York, consists of an endless train of pallets, provided with grates, which travel under an ignition burner and over a wind box equipped with a down draft suction fan. The machine has an effective grate area 42 in. wide and 26½ ft. long. The pallets travel on an endless track and are driven by two large sprockets at a speed of from 1 to 3 ft. per min., depending on the nature of the material to be sintered.

The pallets pass under the limestone hopper and receive a thin layer of this material. The limestone is crushed to 1¼-in. size. It is used to protect the grates and to prevent them from filling up with sinter mixture. Limestone is preferable to other materials for the obvious reason that it is beneficial to the operation of the blast furnace. The pallets then travel under the swinging feeder and receive a layer of sinter mixture. The depth of this layer is variable depending upon the fineness or coarseness of the mixture. There is always some critical thickness for any specific mixture at which the greatest quantity and the best quality of sinter is produced. Even with the ideal arrangement of bins and feeders employed at this plant the thickness of sinter mixture layer varies from day to day.

According to the principle involved in making sinter under the Dwight & Lloyd patent, there is sufficient carbon in the sinter mixture to support combustion, providing the necessary ignition and oxygen are supplied. Flue dust is a homogeneous mixture of fine iron ore and coke and at this plant the flue dust contains enough coke to support combustion at all times. The ignition burner is arranged for burning fuel oil. It is 2 x 4 ft. overall, made of firebrick enclosed in a cast-iron shell, and suspended directly over the pallets.



One of the 100-In. Fans Driven by a 115-Hp. Motor

The flame must be of sufficient intensity to ignite positively the entire surface of the charge without completely drying it. If the mixture is prematurely dried, the sintering action is retarded. The pallets travel slowly while combustion is going on. Finally when combustion is completed the pallets arrive at the end of the machine where they are dumped by dropping one pallet at a time down a curved track. Each pallet hits the one ahead of it a blow that throws the material against an inclined grizzly screen.

The problem of governing the speeds of the various units in this plant has received the most careful consideration. This is especially true with regard to the feeding of materials to the sinter machine. It is necessary that the speed of the machine have a constant relation to that of the feeding mechanism, so that at all times they will be in positive synchronism. This is accomplished by using an adjustable speed motor which drives an adjustable speed countershaft. The sintering machine is driven directly from the constant speed pulley, and the feeders are driven from the adjustable speed countershaft. The result of such an arrangement is that when the various feeder gates are set to give a definite mixture, the proportions are maintained accurately, while the volume is varied at will by decreasing or increasing the speed of the feeders.

A suction of about 17 in. water gage is maintained in the wind box by means of an American Blower fan direct connected to a 115-h.p. motor. The fan is 100 in. in diameter; it revolves at from 625 to 720 r.p.m. and has a capacity of 25,000 cu. ft. per min. The gases passing through the fan seldom exceed 350 deg. F. The fan is enclosed in a steel casing and the bearings are water cooled. The fans and motors are housed in a 24 x 34 ft. dust-tight room on the ground floor. Underground flues convey the gases to a single 60 in. x 80 ft. stack.

The wiring is arranged so that the control of all motors is concentrated at a switchboard between the sintering machines. Since the clutch levers of the feeding mechanism are also operated from this point, the movement of the material from the time it leaves the storage bins to the time it is converted into sinter may be directed by one man, located at this central control station. This arrangement has simplified the labor problem and enables the man in charge of the plant to supervise the actual sintering of the flue dust without neglecting the other apparatus.

The grizzly screen receiving the sinter is 5 ft. wide by 12 ft. long, set at an angle of 32 deg. with the horizontal. The bars of the screen are spaced to give a clear opening of $\frac{3}{4}$ in. The finished sinter passes over the screen and into a railroad car. The material that passes through the screen is called returns and drops into another railroad car. This material is returned again into the system for further sintering, as stated.

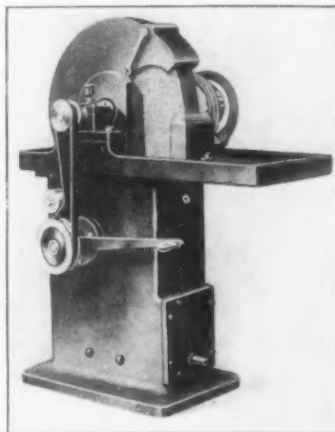
The plant was designed, fabricated and erected by the C. O. Bartlett & Snow Company, Cleveland.

The E. A. Laboratories, Inc., 52 Broadway, Brooklyn, N. Y., has purchased the business of the Automobile Supply Mfg. Company of that city and will continue the manufacture of the line of horns formerly made by the Automobile Supply Mfg. Company.

Manganese ore shipped from the Russian ports of Poti and Batoum in 1916 was 9769 tons against 9750 tons in 1915 and 788,214 tons in 1914.

Floor Type Wet Tool Grinding Machine

Employing a chain arrangement for bringing water to the work that is being ground is a feature of a heavy-duty floor type wet tool grinding machine that has been developed by the Noble & Westbrook Mfg. Company, Hartford, Conn. This arrangement, it is pointed out, does away with the use of pans, valves and pumps to bring water or other cooling compound from the reservoir in the base to the wheel, and at the same time danger of overflowing is avoided.



A Chain Arrangement for Supplying Water to the Work Has Been Substituted for the Pump and Piping Ordinarily Provided

The machine is intended for hard continuous service and in the design an effort has been made to secure durability and freedom from vibration. The steel arbor upon which the wheel is fitted runs in cast-iron bearings provided with a take-up arrangement. The machine is driven by a belt connection from a countershaft to tight and loose pulleys on the arbor.

Machine number	4	5
Diameter of wheel, in.	20	24
Width of wheel, in.	2 $\frac{1}{2}$	3
Speed of wheel, r.p.m.	950	850
Height of top of rest, in.	39	38
Domestic shipping weight, lb.	700	1,100

Two sizes of machine are built and the specifications for both are given in the accompanying table.

Steel Block Gage Standards

A set of gage standards which are now made in America has been placed on the market by Schuchardt & Schütte, 90 West Street, New York. These standards are the usual steel blocks of a definite height and thickness, but of varying precise lengths. They are designed for use in connection with a holder and pair of jaws for the gaging of work without using a micrometer or entailing the investment in permanent gages of a specified dimension. Variations of 0.001 in. are obtainable, and accuracy to 0.00001 in. at 62 deg. Fahr. is claimed. The standards are furnished in sets of various sizes, one, for example, consisting of 81 blocks ranging from 0.1001 to 4 in., with three pairs of jaws and five holders. The entire set is kept in a hardwood box and sufficient space is provided in the compartment for the holders, so that a setting may be placed there for later reference if the work of inspection should be interrupted.

Magnesite from Greece in 1916

Magnesite is reported as one of the features of the Grecian export movement to the United States in 1916. A total of 69,837 tons valued at \$1,161,102 was exported from the Athens district, as compared with 43,217 tons, valued at \$293,694 in 1915 and 18,433 tons with a value of \$108,181 in 1914. The increase last year, in quantity and value was thus very large, due to the impossibility of securing Austrian magnesite as well as to its superior quality.

Freyne & Co., 643 Peoples Gas Building, Chicago, have been incorporated with a capital stock of \$175,000 to succeed Heinrich J. Freyne, Inc. The contracting and engineering work in the iron and steel industry previously conducted by the latter firm will be continued along more extended lines. Heinrich J. Freyne is president and C. D. Rawstorne, secretary.

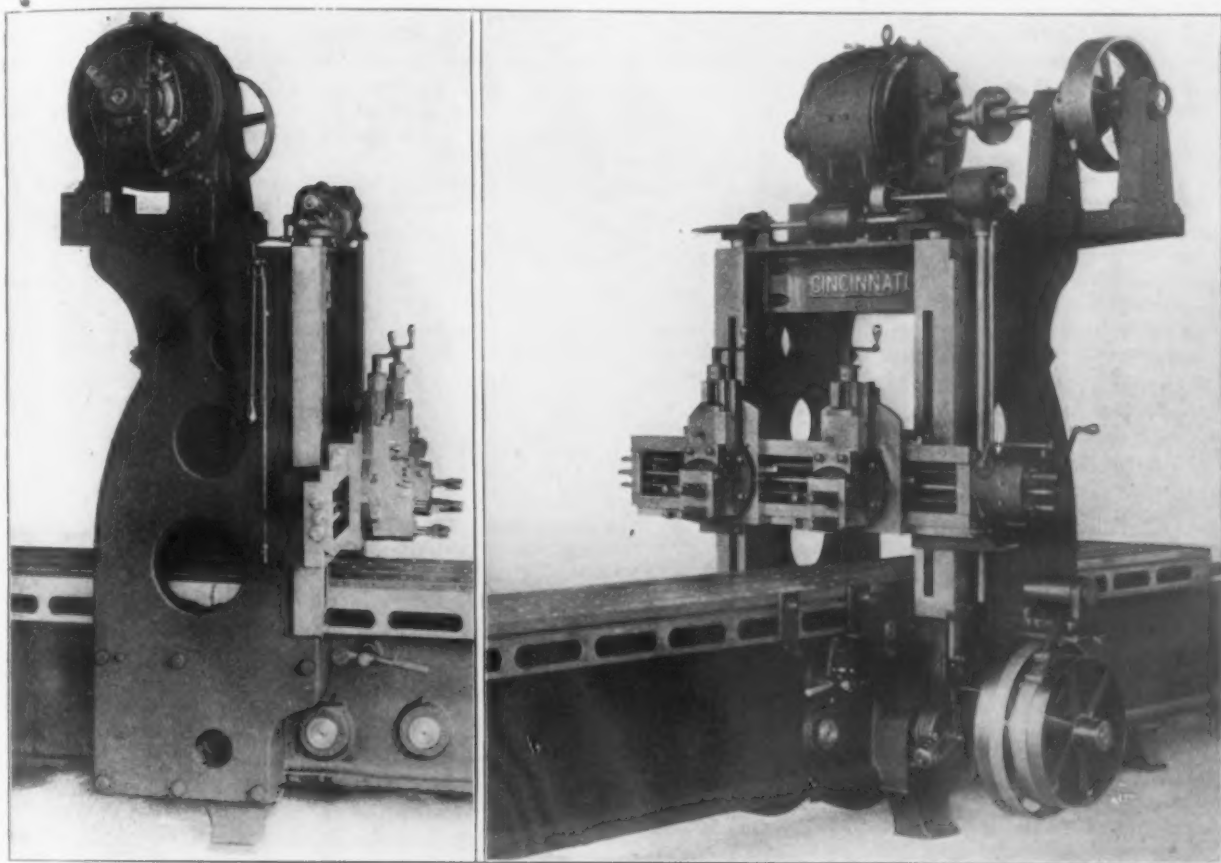
Planing Machine with Box Bed and Table

Box type construction for the bed and table characterizes a planing machine brought out by the Cincinnati Planer Company, Oakley, Cincinnati. An improved form of shifting mechanism, a special design of cross-rail and an automatic limit stop for the elevating device, are other features of the machine, which is designed for work not larger than 30 x 30 in. in cross-section.

The top of the bed between the V's is closed except at the gearing section. The bed is bored to receive the

rectangular clamp in place of the circular arrangement formerly used. Rapid power traverse to the rail heads is provided being driven from the top of the machine through a pair of bevel gears. The friction clutch controlling the engagement of these gears is manipulated from the end of the cross-rail and is thus within easy reach of the operator at all times. The customary provision to prevent the engagement of the feed and the rapid traverse at the same time is provided.

The automatic limit stop which is provided for the elevating device consists of a vertical rod equipped with two collars and connected to the shifting levers of the



A Box Type Bed and Table and a Special Automatic Limit Stop for the Cross-Rail Elevating Device Are Features of a Recently Developed Planing Machine for Work 30 In. Square

shaft bearings and in mounting the driving gears inside the bed two bearings are provided for their support, thus entirely eliminating the overhung construction. The box type of construction, it is emphasized, does away with danger to the operator. The driving pulley is of aluminum, and the loose pulleys have self-oiling bronze bushings. A new design of shifting mechanism is employed in which the cam slots are milled into the circumference of a round casting instead of the ordinary flat type. A bracket bolted against the housings supports the cam and provides an extra support for the belt arms. Attached to the lower side of this bracket is a drip pan which is relied upon to catch the oil from the shifting device and keep the belts dry. The table is also of box construction, being closed at the bottom as well as the top.

The housings, which are of box construction also, extend to the bottom of the bed and are fastened to the sides by bolts and dowel pins in addition to a tongue and groove arrangement. Pads are provided on the housings to which brackets to support the driving motor can be fastened if it is desired to substitute motor drive for the builder's two-speed countershaft drive that gives two cutting speeds and a constant reverse.

In designing the cross-rail the reinforced arch on the back has been made a true semi-circle, this section being used, it is explained, to add additional strength to resist the torsional stress imposed by overhung cutting tools. The saddle is carried the full length of the harp and is taper gibbed at the top. An extra clamp is provided at the extreme end and the clapper box has a

builder's standard elevating device for operating friction clutches at the top of the machine. The collars on the rod are set at a predetermined height and as the rod passes through a bracket on the back of the cross-rail one or the other of the collars is brought in contact with the bracket. This causes the vertical rod to move either upward or downward, the motion producing a corresponding change in the levers on the elevating device, which control the friction clutches at the top of the machine for raising and lowering the cross-rail. In this way, the power elevating motion for the cross-rail is disengaged whenever the rail reaches the extreme of its travel in either direction.

Large Tungsten and Antimony Supplies from Bolivia

The tungsten output of Bolivia for 1915 is reported at 792.5 metric tons, an increase of 516.5 tons or 349 per cent over that of 1914, which was 276 tons. The United States took 436 tons and Great Britain 357 tons of the 1915 output. The Bolivian antimony production in 1915 exceeded all expectations, amounting to 17,923 tons as against 186 tons in 1914. Great Britain took the larger part of the 1915 output—16,184 tons, 1589 tons going to the United States.

The Service Supply & Equipment Company, Pittsburgh, Pa., has changed its name to the Duquesne Electric & Mfg. Company.

Engineers Discuss Munitions Problems

Mechanical Engineers at Cincinnati Last Week, Joined by Machine Tool Builders, Devote Themselves to Vital, Timely Subjects

THE problems of making munitions came in for major attention at the spring meeting this year of the American Society of Mechanical Engineers. The meeting was held at Cincinnati, a notable machine tool center, and some of the sessions were held jointly with the National Machine Tool Builders' Association, which opened its Cincinnati meeting on Monday of last week, May 21, as noted at length in last week's issue of THE IRON AGE. The program arranged for two joint sessions on munitions, and in addition a joint session was scheduled for Tuesday afternoon, May 22, on educational and welfare features in the machine industry. A machine shop session of the engineers covering design and organization matters was likewise interesting to the tool builders. The net result was a record-breaking meeting in point of attendance for both associations.

First Munitions Session

Outstanding features of the first munitions session were the emphasis placed on accuracy of production for the very important fact that for presumably trifling defects premature explosions of guns have occurred with the killing of gun crews; that co-operative rather than competitive manufacture should be the condition; that except for the large companies, production should be on what may be termed specialized or mass production on some one part of an article, such as a fuse, and that there should be some central bureau for the collection and dissemination of information on best practices for all kinds of equipment and for the checking for accuracy of the gages made by manufacturers from master gages. At times a tense atmosphere was created by contributions to the discussions of a confidential nature; these owing to the conditions are not here given publicity. The interest was sufficiently intense and the discussion so far from being complete that an adjourned session was voted to be held on Wednesday afternoon in spite of a counter-attraction provided by the local committee in the shape of a boat ride on the picturesque Ohio River.

To impress on the audience how a little carelessness may be disastrous, one of the speakers explained how doubtless through the untimely striking of the fulminate of mercury in fuses, say by unremoved chips, the killing on the front of fourteen gun crews occurred in a single day. Owing to the nature of the discussion, it is inexpedient to mention the names of participants in all cases. The various papers which had been submitted for the munitions sessions have already been reviewed in these columns in the issue of May 10. To a considerable degree impatience was shown in getting opportunities to manufacture shells, but particularly in getting reliable information as to procedure. An impression from the meeting was that many concerns are desirous of getting started as soon as possible in manufacturing for the war and that official Washington is as yet inadequately prepared to push the work with the celerity believed to be demanded.

Briefly, some of the facts and opinions brought out were as follows: In expanding on his paper on the financing necessary in going into munitions manufacturing, F. A. Waldron, consulting industrial engineer, New York, mentioned how as a result of the fact that bonding companies had been hard hit up to the present time, the condition is calculated to work a hardship on small companies and yet it is the aggregate output of the numerous small companies which counts. He held that if bonding companies were inclined to require personal responsibility as well as company responsibility, the individual concern might just as well not be bonded at all.

It was told of a company making a large number

of a certain part per day that it offered the United States Government last March, as it was approaching the expiration of its contract, to make the same or corresponding part for the United States; it got the reply that the Government was not interested. Yet 30 days later it was asked to bid on a quantity which would have represented about twenty days of its capacity in the experience on the former contract. It had, however, dismantled its equipment. On the earlier contract it had received, for purposes of illustration, say, \$1.90 per unit, while at the time of the Government inquiry the theoretical cost was put at \$2.80 to \$3, and all things considered, the company decided not to bid at all.

It was brought out that in smaller projectiles the country had three times the manufacturing capacity needed, presumably because of the relatively small manufacturing facilities at present for guns from which to shoot them. It was emphasized that none but large companies should undertake more than a single part, and that no matter how strong a company may be financially or in respect to its selling organization, it needs to be equipped for specialization.

Much was said of the spirit of co-operation which has existed in Canada, where the representative of any one manufacturer is admitted directly into the plant of any other manufacturer; that all are working for the common good of the Dominion. Some discussion followed on the desirability of formulating a resolution for transmission to the proper authorities in Washington looking to the establishment of the same openness for the interchange of operating information among United States factories. It was brought out that this state of affairs would ultimately develop, and that at the present time in a vital matter, Government intervention would undoubtedly provide admittance in an otherwise closed plant.

C. B. Hamilton, Jr., Toronto, in urging a co-operative basis of manufacture, told how Canada did not start on the competitive basis and also emphasized that most must be expected from the totality of the small shops. He mentioned how the matter of advance payments is of no great concern when the Government buys the material, as has been the case in Canada. He told how success had followed the scheme of dividing the workmen into gangs, each headed by two mechanics who serve to instruct their inexperienced and less proficient associates. In the matter of gaging, Luther D. Burlingame, Brown & Sharpe Mfg. Company, Providence, reported for the committee on screw thread tolerances that the committee was about ready to propose a variety of gaging systems which would be shortly available for the public.

Temporary Plants for Shell Making

John H. Barr, one of the managers of the society, presided at the session of Wednesday afternoon, which was the unexpected continuation of the morning's work. The first paper, "Procuring Special Machines for Munitions Manufacture," was read for the author, H. V. Haight, chief engineer Canadian Ingersoll Rand Company, Sherbrooke, Que. The next paper, "Practical Wartime Shell Making," in the absence of its author, was read by Lucien I. Yeomans, Chicago, who suggested the manufacture of shells in plants of temporary construction, which he said could be erected and in operation within 60 days from the time authority was given. He said that a complete series of machines "for all shell-making operations could be designed along lines that would permit of their construction in immense quantities within 30 days from the time when the necessity for them arose, and at a rate of output that would supply any conceivable demand within the

following 60 days." He suggested that ten such plants might be built in different parts of the country. He said a fine permanent building for "the comparatively simple operations of machining shells" was absurd.

Mr. Yeomans stated: "Final inspection, cleaning, painting, tool-making, etc., would be provided for in fully enclosed buildings at the delivery end of the plant; but the large part of the work would be performed with the lightest kind of shelter over machines, operators, and transfer track, and in the opinion of the writer circumstances would not always justify even this."

R. E. Flanders, manager Jones & Lamson Machine Company, commenting on the type of lathe Mr. Yeomans evidently had in mind, said it consisted principally of castings, with steel bars for ways, with no planed surface whatever, and "bearing some semblance to a machine tool."

H. G. Bertram, John Bertram & Sons Company,

had come to his relief by showing him how he could make parts, if not an entire shell or fuse; and had supplied the material.

At the opening of the final session, Thursday morning, a report was received from the resolutions committee, composed of L. D. Burlingame, Providence, chairman; John H. Barr, New York; Reuben Hill, Detroit; H. E. Harris, Bridgeport, Conn.; C. B. Hamilton, Toronto, Can., and J. B. Doan and A. J. Baker, Cincinnati. The resolutions submitted, and adopted after brief discussion, are here noted in full.

A. S. M. E. Clearing House Suggested

In consequence of the long discussion of Tuesday morning on collecting information on munitions manufacture, and making it available to the members, Frederick A. Waldron, New York, presented a resolution providing for the raising of a fund of \$30,000 for the establishment of a clearing house of information con-

Action Respecting Munitions Making Urged by American Society of Mechanical Engineers

For Dissemination of Munitions Standards

Whereas, Serious delays have been experienced in other countries and this country in the production of munitions work, and rejection and unnecessary loss to manufacturers, and its consequent shortage of labor and material due to lack of control of data and of standards of measurement; and

Whereas, Great Britain, Canada and France have found standardization of measurement of all war material for both Army and Navy imperatively necessary to obtain uniform and reliable results, and have constructed an efficient organization, which has proved successful in overcoming these difficulties; and

Whereas, Increased efficiency of our manufacturers would be promoted by the establishment of proper standards of measurement; be it

Resolved, That the Congress be urged to appropriate sufficient funds for expenditure through the Munitions Board, or other agency, to provide standards and adequate means of calibration, distribution and supervision of such standards, including means for calibration of working and inspection standards in the different centers of munitions manufacture.

Also that provision be made in this appropriation for the establishment of a central office for the collection and dissemination of information on the methods of manufacturing munitions and other supplies.

Resolved, That the American Society of Mechanical Engineers indorses any effort tending to promote the ends outlined above, and in view of the imperative needs of the present situation most strongly urge immediate action.

Want No Secrets in Munitions Work

Whereas, It is the patriotic duty of every manufacturer to facilitate and expedite the manufacture of munitions and other supplies for the Army and Navy, be it

Resolved, That an appeal is addressed to all manufacturers and engineers to co-operate in the dissemination of information and the interchange of data pertaining to methods of manufacture, system of organization, design of tools, operation of layouts and time studies, including what is generally known under the term "shop secrets," so far as they pertain to munitions manufacture.

Should Recognize Munitions Workers

Whereas, It is necessary to obtain the patriotic co-operation of every man who can contribute to the furnishing of naval and military supplies, be it

Resolved, That the American Society of Mechanical Engineers urge upon the Government the necessity of indicating in some way the value and loyalty of men in service in industries whose occupation is essential to the production of war supplies.

Dundas, Ont., in a written comment on the manufacture of the 9.2-in. shell, said that one reason for the failure of so many contractors was their lack of appreciation of the magnitude of the work, while another was their lack of organization. To properly equip a plant required five or six months. He did not believe in such "mushroom shops" as had been described, and he said the writer might well be called on to tell how he would obtain his materials in the required time. Established plants were far better able to handle the work.

Conscription to Be Helpful

Reuben Hill, works manager Canadian Detroit Lubricator Company, Walkerville, Ont., said that conscription will be a great help, as it will seek out the skilled men and use them where they are of the greatest value. He expressed his faith in the government, and said that in matters of management there could be such a thing as too large a commission, as the experience of England had shown; that the early trouble of the small manufacturer in Canada was fear, and that the government

cerning the activities, production and possibilities contained in the A. S. M. E. for effective war work. On motion of E. H. Neff, New York, it was referred to the council for action.

F. B. Gilbreth, New York, raised the question of the wisdom of having workers in munitions factories wear uniforms. Reuben Hill, Detroit, opposed the idea, saying that it had failed in the Canadian plant of his company. He suggested buttons. Facetious references to kilts caused the president to bring the discussion to a close. In doing so Mr. Hollis said the question was really one for serious consideration.

Enthusiasm Aroused by Major Bond

Maj. Philip S. Bond, U. S. A., made an address which aroused the admiration of his hearers. He covered many subjects having to do with the war situation, and, incidentally, referred to the tendency of people to go to extremes. He said the volunteer system had always proved inefficient, and that it had again broken down was not surprising. Universal service must be

recognized, and under conscription there would be no slackers—there would be no use for the word. All men who should be called will be called, and those whose services are not needed cannot fairly be called slackers. He said that the success of the Allies was greatly due to their maintenance of an effective enfilade, or raking fire, which permitted their men to advance until a trench was occupied, and in this connection there had been much complaint of "shorts" among the shells, the reference being to those which exploded prematurely, frequently killing friends instead of foe.

Machine Shop Session

At the machine shop session, Tuesday morning, under the auspices of the subcommittee on machine shop practice of the society, the following papers were presented: "A Foundation for Machine-Tool Design and Construction," by A. L. De Leeuw, Singer Mfg. Company, Elizabethport, N. J.; "Machine Shop Organization," by Fred G. Kent, Lodge & Shipley Machine Tool Company, Cincinnati, and "Metal Planers and Methods of Production," by Charles Meier, Cincinnati.

In the words of the official summary of Mr. De Leeuw's paper, he "emphasizes the fact that engineering development has been most rapid in those branches which have had the assistance of mathematics and science. For example, the development of the steam engine in its first stages was slow and hesitating; but when the fundamental facts of thermodynamics were understood its progress became more rapid. . . . Similarly in respect to machine tools, questions are enumerated upon which information is needed in order to follow the line of recent development of the steam engine. These relate particularly to the functions and action of the cutting tool, the action of the cutting lubricant, etc."

Commenting on his paper, Mr. De Leeuw said it was intended to direct attention to the fact that one of the greatest industries rested on no scientific foundation; and that in his opinion all the functions of cutting metals are reducible to mathematics.

Among the questions, he said, which should be answered before we can design machine tools in a thoroughly scientific manner are the following:

When we turn up a narrow disk by means of a square-nosed turning tool of which the width is greater than the width of the disk, is the action of removing the chip purely a matter of tension? Or, if not, what is it?

Does the front end of the tool have any function at all?

How far from the edge of the tool is the point where the chip strikes the tool?

If the action is purely a matter of pull, and the chip does not strike the top of the tool at the cutting point, but some distance farther back, then is it necessary that the cutting edge of the tool be sharp?

What is the nature of the lamination of the chip?

How much power is required for the actual removal of the chip, for the friction between chip and tool, and how much for laminating the chip?

What would be the best shape for such a turning tool for this particular turning operation?

How does the amount of power vary with the various angles of the tool?

If the turning operation is not as simple as the one assumed in question *a*; if, for instance, there is a side feed, such as in ordinary shaft-turning operations, how is the cutting action modified by this side feed?

If the chip is removed by the action of the top of the tool, that is, if the front of the tool has no function, then what determines the nature of the finish of a cut?

In what relation does the power required for the side feed stand to the power required for the actual removal of the chip?

In conclusion he suggested lines of experimentation.

Views on Lubrication

On behalf of Albert Kingsbury, consulting engineer, Pittsburgh, some written observations on the action of lubricants on metal-cutting tools were read. "Good lubricants of rather high velocity, such as lard oil, are very effective," he said, "when the cutting speed is slow, as in tapping and reaming by hand; but if the cutting speed is high, as in high-speed milling and drilling, lubricants of very low viscosity, such as soda water or soap and oil emulsions, are more effective. The lubri-

cant is forced into the vacuum in the crack mainly by atmospheric pressure (capillarity probably being secondary if the cutting speed is high). Therefore, if the viscosity of the lubricant is high the cracks may not be filled fast enough.

"In the case of a parting tool cutting off a bar, the tool lubricates well at the beginning of the cut, but not when the cut becomes deeper. In the deep cut the chip 'upsets' and fills the slot and therefore the lubricant cannot readily enter the cracks from the sides of the cut. Thus it has been found efficacious in large work to use two tools simultaneously in parting or slotting cuts, the leading tool being narrower than the following tool; thus both tools are fairly lubricated, the leading tool from both edges, and the following tool from one edge of each of its two narrow chips.

"In finishing cuts with broad tools, the lubricant must penetrate the cracks for long distances; thus it is necessary to run slowly and to use thin lubricants, such as kerosene or turpentine. More viscous lubricants may be used if the speed of cutting be exceedingly slow. There must be sufficient time for the lubricant to flow in the cracks from the edges to the center of the cut.

"In slab milling, etc., it is found advantageous to notch the cutting edges at frequent intervals; this breaks the wide chips into narrow ones and thus favors the entrance of the lubricant.

"In general, the more viscous lubricants are used only for slow speeds or narrow cuts, the less viscous for higher speeds or wider cuts. Even a poor lubricant, if it flows readily enough to penetrate the cracks rapidly, is more effective than a good lubricant which is too slow in getting to the spot where it may be effective."

Need of Research Work Discussed

Prof. A. Lewis Jenkins, University of Cincinnati, said that at the suggestion of Mr. De Leeuw a set of the De Leeuw cupshaped cutting tools had been subjected to 600 tests and that the results compared favorably with those obtained with the O. K. or Taylor tools, in fact, were better, as the De Leeuw tool left no chatter marks when a heavy cut was taken.

L. P. Alford, New York, speaking as a member of the Research Committee, said that the committee had given considerable attention to ways in which the Government might be helped in its war plans and work, and that at a meeting held the previous day it had been decided that a sub-committee should concentrate on this phase of the situation. F. A. Waldron urged co-ordination to eliminate waste effort such as was involved in useless tests; also advocated a new classification of machine tools. The latter he would broadly divide into three groups, namely: machines of convenience (such as are used in the jobbing shops), machines of precision (such as are used in the tool-room, etc.) and machines of displacement (whose function it is to remove the maximum quantity of metal in the minimum time, meanwhile subjecting the machine to the minimum of stress and the cutting tool to the least wear). He said it is impossible to design a machine tool that can properly be classed as universal.

Charles Fair, General Electric Company, Schenectady, N. Y., urged that the proposed investigation should eliminate all that is known and proceed in a systematic manner into that portion of the field of which less is known. Mr. Alford pointed out that his committee could not proceed far without money wherewith to meet the expense of experimentation.

Learn First—Teach Afterward

Mr. De Leeuw urged that members be sure they have arrived at the correct facts themselves before they endeavor to instruct shopmen. He said the man in the shop is not kindly disposed to experiments. Another member stated that quick action is wanted, and the shop managers of the country should throw open their doors and disclose their methods as the automobile shops have done.

Mr. De Leeuw said that for several reasons the lathe, as now constituted, is unfit for using rotary cutters. In his paper he referred to the test of such a tool wherein, with a reduction of 3/16 in. in diameter

and a feed of 12 to the inch, a cutting speed of 650 ft. was used for cast-iron as well as for steel. This tool, when cutting, revolves with a slight difference in speed between the work and the tool. It was found that the cutting speed was limited only by the machine. Detriments were that much power must be transmitted through the lead screw that it might not be safe to support a heavy piece running at high speed on ordinary centers, and also that the rapid feed made the approach of the tool to a shoulder on the work a dangerous proposition with present facilities for throwing out the feed. He expressed confidence in the American engineer to apply knowledge after he gets it.

Machine Shop

Mr. Kent's paper dealt with the fundamentals of a typical machine-shop organization. It began with a discussion of the methods for introducing changes in the way of reorganization, referred to the section of men and their qualities, and analyzed the make-up of departments. He asserted that the machining department may have one general foreman, with his assistants in charge of sub-divisions, and under the assistants he would have an instructor for every ten men. It would be the duty of instructors to see that jobs are properly set up, tools properly selected, and proper speeds used. He said:

"The writer is a firm believer in placing machines of a kind together; that is, lathes in one section, drilling machines in another, and so on. It keeps down the amount of the investment. It makes a better balanced condition, and the work goes to a foreman who knows more about that particular operation than an all-around man can ever hope to know."

Mr. Barth expressed himself as particularly pleased by the suggestion of an instructor for every ten men, and he gave some examples of where the reverse was true to an extreme degree.

Mr. Flanders said that where small parts were concerned it was better to group machines according to their functions, but on heavy work they should be placed to enable the operations to be done in progression. The line followed by a heavy casting in its progress through a shop should be as straight as possible. Mr. De Leeuw said that he believed it impossible to lay down a general rule on the subject, as so much depended on the character of the product and the quantities produced. Both systems are used in the shops of the Singer Mfg. Company with which he is connected. While there is a screw machine department and a press department machines of these types are often isolated. It was agreed that further discussion of Mr. Kent's paper should be submitted in writing.

Addresses on Education and Welfare

At a joint session held Tuesday afternoon Dean Herman Schneider, University of Cincinnati, addressed the meeting on "The Trend in Engineering Training." He described the system in vogue in the university, the principal feature of which is the alternation of classroom studies with shop work in one or another of the plants in the vicinity of Cincinnati. The students spend two weeks at their books and two at practical work. While doing the latter they are regarded as regular employees, and in all cases start from the bottom. At present 500 students are in training, while the applicants for enrollment are four times as many. From every angle the system has been a success. In conclusion, Dean Schneider said that the ideal course in engineering consisted of obtaining a good balance in knowledge of men, organization and material.

Capital and Labor After the War

At the conclusion of an address on "The Human Potential in Industry," Dr. Otto P. Geier, Cincinnati Milling Machine Company, Cincinnati, was accorded long applause. He said that having learned the advantages of co-operation in war, labor and capital were not likely to abandon it after the war, and that existing conditions presaged a new social order after the present conflict is settled. He laid great stress on the

importance of conserving the worker's health and of the value derived from plant dispensaries in charge of physicians in whom the employees will place confidence. He thrilled his hearers as he cited case after case where men because of some physical defect were on the down grade, and who were saved to themselves, their families and employers. The germ of the idea is not to wait until men actually break down before caring for them, but to win their confidence while their trouble is incipient, thereby heading off the otherwise inevitable collapse. That the work is not a charity Dr. Geier emphasized. He said it pays good dividends.

General Features of the Dual Meeting

The social side of the combined meetings was unusual, particularly in point of originality. Outstanding were two evenings devoted to entertainment and dancing, an afternoon boat ride on the Ohio River and a smoker at the Business Men's Club. In the last were a number of specially written sketches performed by local talent drawn from the engineers and manufacturers and with a program so nearly continuous and with the numbers executed at so many different points of the compass that the audience might conveniently have been provided with revolving chairs. One of the features was a presentation, not without its dramatic side, to Dr. I. N. Hollis, president of the American Society of Mechanical Engineers, of an unusual piece of Rookwood pottery. Parts of the musical selections of the program were rendered by the shop band of the Cincinnati Milling Machine Company.

It was brought out at the meetings that both the National Machine Tool Builders' Association and the American Society of Mechanical Engineers subscribed for \$10,000 of the Liberty Loan bonds.

Goethals Made Honorary Member

President Hollis announced that George W. Goethals had been made an honorary member of the society, the statement being greeted with applause. Honorary membership is limited to twenty-five, who are chosen from those of acknowledged professional eminence. To create one the unanimous vote of the council is required.

Dr. Robert Grimshaw addressed the society on the subject of his visit to South America, told to the machine tool builders, as noted in last week's issue. His plans are to leave on June 2 and to visit the countries of the west coast of South America first. Besides an inventory of manufacturers here who are desirous of participating in South American business and a census of buyers in South America, he intends to secure samples of products for the museum which the Department of Commerce has in New York, giving information of the sources of supply and the prices obtained.

Special resolutions or memorials were read before both the American Society of Mechanical Engineers and the National Association of Machine Tool Builders on the late William Lodge. The presentation in the engineers meeting was made by James Hartness, president Jones & Lamson Machine Company, and to the machine builders by a committee of which Murray Shipley, Lodge & Shipley Machine Tool Company, was chairman. Mr. Shipley said that Mr. Lodge was really the founder of the Machine Tool Builders' Association and the father of the machine tool industry of Cincinnati. Mr. Lodge was also described as a pioneer in manufacturing in large lots.

A meeting of American and Canadian Engineers of Norwegian birth or descent is to be held in Chicago, Sept. 27 to 29, at the Chicago Norske Klub, 2346 North Kedzie Boulevard, Chicago. A. Kaarbo, experimental engineer, Hydraulic Pressed Steel Company, Cleveland, and Leif Lee, consulting engineer Youngstown Sheet & Tube Company, are members of the invitation committee, and J. H. Hoff, manager, designing department, American Bridge Company, Chicago, and Leonhard Holmboe, chief engineer Illinois Steel Company, are members of the Chicago committee on arrangements of which Joachim G. Giaver, consulting engineer, is chairman.

Steel Ships Under the Goethals' Program

Shipping Board Endorses the Plan and the Aid of Fabricators, But Expects to Build Wooden Vessels Also

WASHINGTON, May 29, 1917.—The acknowledgment by the officials of the United States Shipping Board that the program for the construction of 1,000,000 tons of wooden ships must be radically amended in favor of steel construction, and General Goethals' unqualified tribute to the steel producers who have patriotically undertaken to build a large number of ships in an unprecedentedly short time, have been the overshadowing features in the development of war plans during the past week. Real progress in other directions still lags, however, and as the days pass both administration officials and national legislators are more and more impressed with the stupendous character of the task before them.

General Goethals' Stand

General Goethals' statement before the Iron and Steel Institute on Friday, in which he described the complete demoralization of the Shipping Board organization when he assumed the post of general manager of the Emergency Fleet Corporation, has served to let the public into what has long been an open secret here. Disclaimers of friction in the board made by Chairman Denman and others have been far from convincing to those familiar with the situation here.

In a statement given out here last week, Chairman Denman expressed the board's appreciation of the action of the steel industry in promising to supply "a very large amount of steel for shipbuilding within the period of a very few months, increasing gradually from the present to a maximum to be reached about October." The chairman also expresses the board's approval of General Goethals' plan, which, through standardization of construction and fabrication of material in the steel mills, promises to increase enormously the output of steel vessels, the program involving the building of 3,000,000 tons in 18 months. As already foreshadowed, this plan involves the taking over of all vessels now being built in American yards for foreign account, provided their size, type, and possible date of completion make it desirable to add them to the emergency fleet.

And Again It Will Be Wooden Ships

After thinking over General Goethals' remarks at the Iron and Steel Institute dinner at New York, Chairman Denman evidently concluded to modify his first statement, and in Monday morning's papers is quoted as saying that if all the ships that can be built are brought out in the next 18 months there still would be need of 1000 wooden ships to make good the deficit in our merchant tonnage. He did not know whether 1000 wooden ships could be built in 18 months. The same papers refer to a remark at the offices of the Shipping Board that the speech of General Goethals' would have no effect whatever upon the determined policy of the board. It was added in the same connection:

We shall go ahead as we originally planned, using both steel and wood to the limit of the shipyards' capacity. As soon as it is possible to turn to steel exclusively we shall do so, as we always have intended. But for the present, when we need every available ton of shipping to thwart the German submarines and to carry supplies to the Allies, we shall build wood as well as steel.

Efforts are still being made in Congress to place a limit upon the amount of the appropriation for the

Shipping Board which may be spent for the condemnation of foreign-owned vessels, the contract prices of which are far in advance of those prevailing in normal times. The amendment of Senator Smoot limiting such purchases to \$250,000,000, and which was defeated when offered as a modification of the war budget bill, will not be abandoned. Those Senators and Representatives who agree with Senator Smoot take the position that the Government should not buy an unlimited number of ships at prices in excess of \$150 or \$175 per ton, as these vessels will be operated after the war is over in competition with the merchant navies of the world, the average cost of which has been less than \$50 per ton.

The Labor Problem in Shipbuilding

The Federal Employment Service of the Department of Labor has assigned C. T. Clayton to direct the organization work in connection with the mobilization of American labor in shipyards to carry forward the Shipping Board's plan of constructing 3000 steel and wooden ships. Appeals have been sent out to colleges, technical and manual training schools, and other institutions, to assist in providing a large force of engineers, designers, draftsmen and skilled workmen. Officials of Columbia University, New York, have agreed to supply 1000 men trained in various occupations related to the shipbuilding industry, and the Brooklyn Polytechnic Institute has offered 500 men. Technical institutions and manual training schools are being urged, especially, to establish night classes to equip men already more or less skilled in the various trades for ship carpenters, joiners and calkers.

With a view to utilizing skilled labor only where absolutely necessary, the Shipping Board is planning to employ several thousand boys as apprentices and helpers. Francis S. Edmonds, chairman of the School Mobilization Committee of Philadelphia, has begun a movement to secure 2000 boys through Girard College and other schools of Philadelphia and vicinity.

EYE PROTECTION IN WORKS

Bureau of Standards on the Effect of Heat and Chemical Rays

WASHINGTON, May 29, 1917.—Valuable data for the selection of spectacle glasses designed to protect the eyes of workmen from the heat and chemical rays radiated from masses of molten metal, glass, etc., are contained in a paper about to be issued by the Bureau of Standards, prepared by W. W. Coblentz and W. B. Emerson.

Although it does not appear to be definitely proven that the infra-red rays from incandescent bodies, such as, for example, molten metal, are injurious to the eye, there is, nevertheless, a general feeling that the eye becomes fatigued, if not permanently injured, by prolonged exposure to the intense heat from furnaces.

Researches heretofore made appear to indicate that no artificial source of light used for illuminating purposes contains enough ultra-violet radiation to be injurious to the eye, under practical working conditions, while the infra-red rays have no specific action distinct from thermal effect. However, in view of the fact that the infra-red rays are present in far greater abundance

than the ultra-violet, the inference is that "glassworkers' cataract" is to be ascribed to the heat rays rather than to the ultra-violet rays. Exposure to excess of ultra-violet light is injurious, causing conjunctivitis.

Within the past few years numerous glasses have been produced which differ from the ordinary white crown glass used in spectacles in having a high absorption in (1) the violet, (2) in the infra-red, or (3) in both the ultra-violet and infra-red. These glasses differ in the amount and color of the light transmitted. It is often desirable to have glasses which transmit a great deal of light and yet are opaque to the extremes of the visible spectrum. Glasses having a gray or neutral tint are the most agreeable to wear, as they do not alter the color of objects. Hence, for outdoor wear ordinary black glasses, which can be obtained for a few cents, are quite as good as the expensive glasses which one frequently sees advertised.

In connection with the question of injury to the tissue of the eye caused by radiant energy, the question of fatigue caused by the action of the ocular muscles should also be considered. For example, the flashes of light from the small galvanometer mirror into the eye, when astatizing a Thompson galvanometer, and the flashing of fireflies when photographing the spectrum of their light are found to be very fatiguing, so much so that painful effects are still felt the following day.

Best Protection from Ultra-Violet and Heat Rays

As the result of tests made with many different kinds of glasses the authors present the following summary:

"The object of the present paper is to give the general characteristics of certain newly developed glasses sometimes used for protecting the eye from radiant energy, especially the infra-red or so-called heat rays. Because of the difficulty in reproducing the same color in different melts, no attempt is made to give specific data on the transmission for a given thickness of glass. In order to obtain exact data it is necessary to examine samples from each melt.

"These data are representative of an extensive group of glasses available for protecting the eye from (1) the ultra-violet, (2) the visible, and (3) the infra-red rays.

"For protecting the eye from ultra-violet light, black, amber, green, greenish-yellow, and red glasses are efficient. Spectacles made of white crown glass afford some protection from the extreme ultra-violet rays which come from mercury-in-quartz lamps and from electric arcs between iron, copper or carbon. The vapors from these arcs emit but little infra-red radiation in comparison with the amount emitted in the visible and in the ultra-violet.

"For shielding the eye from infra-red rays deep-black, yellowish-green, sage-green, gold-plated and bluish-green glasses are the most serviceable. For working near furnaces of molten iron or glass, if considerable light is needed a light bluish-green or sage-green glass is efficient in obstructing the infra-red rays. For working molten quartz, operating oxyacetylene or electric welding apparatus, searchlights, or other intense sources of light, it is important to wear the darkest glasses one can use, whether black, green (including gold-plated glasses), or yellowish-green, in order to obstruct not only the infra-red but also the visible and the ultra-violet rays.

"One can easily decide upon the kind of glasses to use to protect the eye from the visible rays. The question is not so easily settled concerning the elimination of the ultra-violet and the infra-red rays. The data presented herewith give some clue to what can be accomplished in eliminating the infra-red rays.

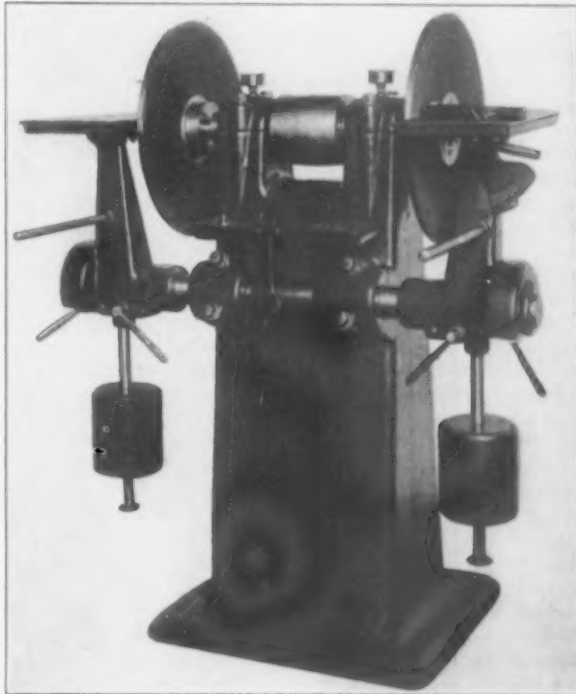
"Data are given showing that of the infra-red rays emitted by a furnace heated to 1000 to 1100 deg. C. (1) about 99 per cent are obstructed by gold-plated glasses, (2) about 95 per cent by sage-green or bluish-green glasses, (3) about 60 to 80 per cent by very deep-black glasses, and (4) about 60 per cent by greenish-yellow glasses.

"At higher temperatures these data would be somewhat different, but not sufficiently so to modify the rough estimates dealt with in this paper."

A Disk Flat Surface Grinding Machine

A clamping handle located directly underneath the universal table controls the angular adjustment in the disk flat surface grinding machine that has been brought out by the Charles R. Carpenter Machine Company, Robbinsdale, Minn. All of the adjustments of the machine, including the table arms and the thrust bearings, are controlled by clamping levers, thus obviating the necessity of wrenches.

The machine is equipped with two steel disks 18 in. in diameter upon which the abrasive disk is cemented. The arbors on which the disks are mounted are of hard-



Angular Adjustment of the Universal Table Is Quickly Secured by the Graduated Table Top and Protractor Blade in Conjunction with a Clamping Handle Directly Underneath.

ened steel, 1 3/4 in. in diameter, and run in split bronze bearings provided with adjustment for wear. Power is transmitted to the arbor through a 6-in. semi-steel pulley which is shrunk on the arbor.

The supporting stud for the table arm is of machinery steel fastened in place by cap screws. The journal portions of the stud are finished by grinding and brass compression grease cups supply the lubrication the same as for the arbor bearings. The table arms have clamping handles located almost directly above the counterweights which provide for holding them in a fixed position or releasing them and permitting them to oscillate in the usual way. This change is made almost instantaneously and without the aid of a wrench or changing the adjustment of the table arm bearing. The two-way thrust collar for the table which is inclosed within the table arm, it is explained, makes both thrust bearings dustproof, as well as eliminating the necessity for adjusting the thrust collars at each end of the table arm bearing whenever the arm is adjusted. This thrust collar is of the clamp type controlled by the clamping handle at the back of the machine. The ends of the table arm bearings adjacent to the disks have dust shields which are relied upon to prevent any portion of the table studs that might enter the table arm bearings at any time from becoming covered with grit.

The angular adjustment of the universal table is controlled by a clamping handle located immediately underneath. This arrangement, it is pointed out, in connection with the graduated table top and protractor blade, enables the table to be placed in position for either plain or compound angles readily.

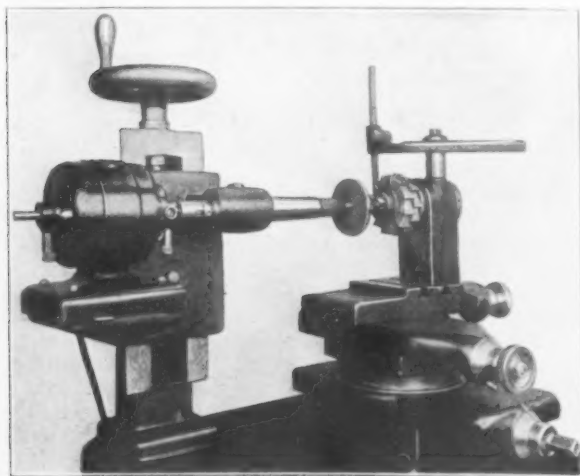
The Cleveland Punch & Shears Works Company, Cleveland, has opened an office at 1928 McCormick Building, Chicago, in charge of Ralph E. Graves.

Profile Tool Grinding Machine

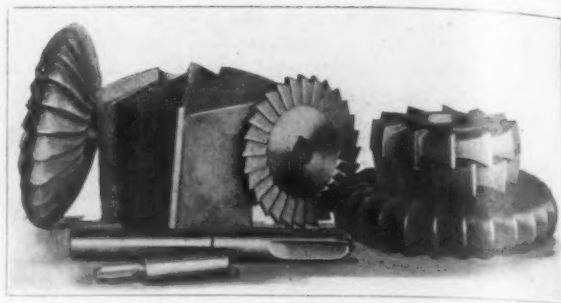
A profile tool grinding machine for forming curves on milling cutters, and particularly concave and convex ones, has been brought out by the Cleveland Milling Machine Company, Cleveland. This machine makes possible the use of a ground profile milling cutter instead of the formed style. The advantages claimed for the former type are that it is cheaper and easier to make than a formed toothed cutter and is more efficient in some cases, owing to the fact that accurate clearance angles can be ground on the top of the tooth. The machine is also designed for grinding a lathe tool to secure the correct radius for cutting a groove, for grinding a radius for the end cutter that is used in rounding out ball sockets, a common operation in automobile plants, for grinding cutters for fluting drills and cutters that are irregular but have a number of true curves, for rounding the corners on side and face mills, for grinding formed tools for screw machines, and for rounding corners of tools for use on lathes, planing, shaping and other machines.

The wheel spindle and the motor are mounted on a vertical housing which is adjusted by a screw provided with a micrometer dial. The motor is easily aligned, owing to the fact that the end of the motor shaft is provided with a tongue which fits loosely into a slot in the spindle. The spindle has adjustable bronze bearings and is designed to compensate for wear by running in a floating bushing. The spindle bearing runs in oil. An emery wheel 4 in. in diameter, with a $\frac{1}{4}$ -in. face and a $\frac{3}{8}$ -in. hole, is ordinarily employed, but a wheel of any diameter that will fit the work can be used.

At the opposite end of the bed is mounted a slide that moves at right angles to the spindle and serves to set the work holding post at the proper radius. The slide is operated by a screw fitted with a micrometer dial. Above the slide, upon which it is pivoted, is a swivel block by which the curve is generated. The swivel block centers on the bottom slide and above the former is a compound slide, the work post being mounted in the upper part. This slide is fitted with screws and micrometer dials. The function of the compound slide is to bring the cutter into proper rotating position in respect to the wheel. The work post is fitted in a T-slot, of which there are three in the upper compound slide, thus providing for a wide range of work. Four work posts are furnished for mounting the cutters, and the arbors for supporting the work are held in a sleeve which revolves in the work post. Three posts have tool steel bushings with No. 9 and No. 7 Brown & Sharpe taper holes. At the rear of the bushing is a lock nut for locking the bushing while grinding. One post has a $\frac{1}{2}$ -in. straight hole and one flat block is provided for holding flat tools so as to cover all classes of work done on the machine. The maximum radius that can be ground is 3 in. on either concave or convex cutters up to 12 in. in diameter.



Grinding the Teeth of a Profile Milling Cutter on a Profile Tool Grinding Machine Capable of Producing Milling Cutters of Various Types and Tools for Screw, Planing and Shaping Machines and Lathes



Some Idea of the Variety of Work Handled by This Machine Can Be Gathered from the Illustration

In setting the machine the wheel is first set for the proper clearance by raising or lowering the slide that carries the spindle. A gage is then used to set the work in the proper relation to the wheel. When the slide is set for any given radius the machine will always grind that radius, regardless of the continued adjustment of the two upper slides. Stops are provided for limiting the movement of the swivel block to any desired segment. A convenient tooth rest is furnished with range to cover all work within the capacity of the machine. The slides are accurately scraped and are provided with gibs for taking up the wear.

The machine is driven by a 1/6-hp., three-speed motor with the power supplied from a lamp socket of 110 volts, direct or alternating current. It is of the bench type and occupies a floor space 24 x 30 in. and its net weight is 217 lb. The equipment furnished includes a Dumore type E universal motor, one emery wheel, four work posts, one $\frac{3}{8}$ -in. and one 1-in. work arbor, one tooth rest and one gage for setting the radius.

Ferrouanium for Uranium Steel

Two patents have been granted to Charles L. Parsons, chief chemist Bureau of Mines, Department of the Interior, on a process for the purifying of uranium compounds and for a process for preparing oxides of uranium. Both are dedicated to the free use of the people. The process for the preparation of uranium oxide is of especial importance at this time because it is now definitely known that the Germans are using uranium steel in some of their large cannon, and this process will enable pure black oxide of uranium to be obtained for the use of producing ferrouanium. Experiments in the production of uranium steel itself are now under way. By the use of the processes above mentioned the production of pure oxide of uranium is very much facilitated and cheapened. Also the product is obtained in a much purer form than has ever been acquired heretofore. Uranium oxide so obtained is also valuable for coloring glass, giving to glass the golden yellow color seen in some of the newer forms of automobile headlights. In connection with the uranium work of the Bureau considerable quantities of uranium were produced and the methods here referred to permit this to be converted into useful forms for commerce.

A pamphlet on Ferromanganese in the Iron and Steel Industry, by Robert J. Anderson, B. S., of Cleveland, has been reprinted by the Franklin Institute from the *Journal* of the institute of May, 1917. Mr. Anderson does not publish anything new nor does he promulgate any startling theories, but he has assembled considerable valuable information in an important subject.

The Fairbanks Company, maker of scales, valves, trucks, internal combustion engines and transmission and power machinery, has opened a branch office in Washington, D. C., at 325 and 326 Colorado Building.

The Bethlehem Steel Company is dismantling the iron ore roaster at the former plant of the Lackawanna Iron & Steel Company, Colebrook, Pa.

The General Fireproofing Company, Youngstown is erecting a large steel addition to its metal furniture department which will be completed July 1.

Steel Men Rally to Support Government

Enthusiastic Meeting in New York of American Iron and Steel Institute

Eight Hundred at Banquet Pledge Themselves to Serve the Country—General Goethals Says Steel Ships Must Be Built—Judge Gary, Chairman Topping and Others Discuss Great Issues of the Day—Record-Breaking Attendance

The supremacy of steel and the absolute necessity of utilizing it to the greatest possible extent throughout the war period were emphasized in a highly impressive way at the twelfth general meeting of the American Iron and Steel Institute, which was held at the Waldorf-Astoria, Friday, May 25. The record for attendance had been broken at the meeting held in New York in May of last year, when more than 750 members and guests were registered, but last week's meeting was attended by nearly one hundred more, 840 being registered and 800 attending the banquet. The explanation of this attendance was not difficult to determine. Men came from far and near, not on pleasure bent, nor did they assemble to discuss business conditions in the ordinary way. They were drawn together because of the intense interest in problems connected with the great war and how the manufacturers of iron and steel can best do their part. Constantly, as men met, subjects relating to the war, which were uppermost in the minds of all, were seriously discussed.

The papers were of a high grade, and a number of the addresses delivered, particularly those of Judge Gary and Mr. Topping, were fully worthy of a great occasion; but the quiet discussion of conditions and the enthusiastic manifestation of patriotism were the outstanding features of the meeting. The climax was reached when at the banquet Major General George W. Goethals was persuaded to leave the table where he had modestly seated himself with a few friends, and to take a place at the speakers' table. Later he was prevailed on to make an informal address, which was received with the heartiest approval. This tall, sturdy man, with his great record as builder of the Panama Canal, spoke in low tones and without oratorical flourish, as a man who does things. He, perhaps, more than any other speaker, impressed upon his hearers the transcendent importance of steel in time of war. But following him, Marcel Knecht, representing the French Commission at Washington, speaking in English, also told of the very great help American steel had been in pushing back the hordes of invading Germans.

At a meeting of the directors of the institute Friday, the officers were re-elected. A large number of candidates were admitted to membership in the institute, and Cincinnati was selected as the place for the meeting next October. It was decided that dues of members of the institute called to the colors would be remitted during the period of their military service.

The Goethals Plan for Shipbuilding

General Goethals, who was presented in a few highly complimentary words by Judge Gary, was enthusiastically cheered and applauded by the 800 banqueters. He said:

"Under a sort of selective draft, I have again been called into the Government service. I am not a shipbuilder, but for some reason which I do not know I have been asked to help in building ships and when I consented to take up this work I found that it had been planned to build one thousand 3000-ton wooden ships in 18 months. Contracts have been promised in all directions, but when I looked for specifications there were none. When it is realized that birds are now nesting in trees which it was expected would go into the building of ships which must have at least 10½ knots and be capable of being speeded up to 11 knots, the hopelessness of the undertaking was apparent.

"With this condition confronting us, I came over to New York and had a talk with President Farrell of the United States Steel Corporation, and asked him whether it would not be possible to obtain steel for the building of the boats that we need. He said that the steel would be furnished. Then I went back to Washington, where it had been decided to provide \$50,000,000 for the building of ships by the selling of Panama Canal bonds, but no effort had been made to sell the bonds. Now money is necessary in shipbuilding as in everything. Boards I have always regarded as long, narrow and wooden (laughter and applause). I believe in absolute authority in carrying out any im-

portant work. I appealed to the House of Representatives committee on appropriations, which is now discussing the matter. It has promised that in ten days or two weeks I shall get the money. I had another talk with Mr. Farrell and, depending on the promises which he made, I believe that I can say that we can build 3,000,000 tons of ships in 18 months. Having in mind that, as these ships should ultimately go into the merchant marine service, if they escape the submarines, they should be built of steel as much as possible, I want the members of the American Iron and Steel Institute to get back of Mr. Farrell and assist him in this undertaking. We must speed up construction on ships now building. Shipyards must lay no more tonnage except for us. We shall need the co-operation of structural material manufacturers and of the fabricators to help us to lay down a fabricated ship rather than a constructed ship. We shall need the help of makers of machinery, of anchors, chains and cables—of everything that goes into the building of a ship. Lloyd George has said this war will be won by the nations that have the ships, and if he is right, everybody who helps in building ships is helping to terminate this war."

The scene at the conclusion of General Goethals's address was one of great enthusiasm, as men stood and waved handkerchiefs and cheered.

"I announced some time ago," said Judge Gary, "that the Steel Corporation and its subsidiaries would do everything in their power to assist the Government.

I feel that all other iron and steel manufacturers will do likewise. I should like to have all who are determined so to do to rise." The response was unanimous.

Marcel Knecht's Response

Mr. Knecht spoke of the tremendous value of iron ore deposits in the Lorraine district and other parts of France now in possession of the Germans. He said that one of the causes of the war was Germany's determination to gain possession of the ore deposits of France. "Most fortunately," he said, "France in its great struggle after the ore districts had been invaded had the help of the United States and iron ore from Duluth was converted into the steel which made it

possible to win the battles of the Marne and Verdun." He said the United States had, however, given more than its steel, for it had given its heart to the cause of liberty and justice, and he paid an eloquent tribute to the women who had gone to France and served as nurses. In conclusion he declared that the Allies are as loyal as steel and that one great result of the present conflict would be that France and the United States would come to know each other better.

The speech of Chairman John A. Topping, of the Republic Iron & Steel Company, was an able discussion of the present conditions as affected by the war, and proposed a definite, constructive program of the war period and of later times.

Chairman Topping's Constructive Program

Mr. Topping's subject was "Co-operation and the Mobilization of Public Sentiment." He said that co-operation is the solution of most of our national and business problems and has been adopted as a principle by the leading nations of the world. Reference was made of the recent announcement of A. Bonar Law in the House of Commons that preferential tariffs had been agreed to as a policy by Great Britain and her colonies. Mr. Topping also said that England has closely followed Germany in the policy of encouraging capital combinations for trade, even to the extent of assisting such combinations by Government loans where necessary. Germany proposes not only to continue her past co-operative methods but also to extend her syndicate operations in the future beyond a mere control of sales, her war experience showing that purchases can also be syndicated to advantage.

"No doubt," said Mr. Topping, "the objection will be raised that the European brand of co-operation is socialistic; but this objection, in my opinion, is sentimental rather than practical, particularly if by the application of co-operation we can advance the general welfare of our country. Furthermore, is not evolution by experience preferable to revolution by force; and does not the co-operative experience of the world justify setting aside former convictions born of other conditions?"

In conclusion, Mr. Topping spoke as follows:

"The mobilization of public sentiment by educational processes, however, takes time and we should not delay our efforts to 'Wake up America' to the problems of peace and to emphasize the necessity for co-operation. To make this accomplishment practical and possible, constructive legislation of somewhat the following character seems necessary:

Proposed Legislation

"First, amendments to the Sherman Anti-Trust Act to legalize price co-operation, subject possibly to government regulation, to become effective after the war, so as to prevent disorderly liquidation of commodity values during the reconstruction period, to stabilize values thereafter and for the protection of the general public.

"Second, revision upwards of the tariff where necessary to protect home trade against unfair foreign competition; preferential tariff rates, however, to obtain wherever reciprocal trade agreements can be made to our advantage.

"Third, a thorough overhauling of our marine laws and the enactment of such amendments as will justify and encourage capital to permanently become interested in the operation of over-seas shipping. If proper protection cannot be given capital to justify it engaging in over-seas shipping and to successfully compete with foreign ships without subsidy, then, in that event, we should subsidize American shipping.

"The method I would suggest for promoting the necessary preliminary campaign of education for the mobilization of public sentiment favorable to this legislative program would be co-operative publicity, which power is now generally recognized and recently was employed by the Academy of Political Science in calling a national conference of our leading citizens to publicly discuss and publish ways and means for improving our foreign relations, the object being not only to promote our diplomatic relations, but to extend our foreign

commerce. Unfortunately, there are not many business men who are willing to devote their time to public affairs. But does not urgent necessity call for patriotic service in this direction? The Iron and Steel Institute *Bulletin* as a publicity instrument could be made useful in many ways to assist in this work without sacrificing its general functions, and thus more completely justify its publication, without being subject to adverse political criticism.

"I am thoroughly convinced that no executive or business man, particularly those who are directing the affairs of public corporations, will hereafter fully measure up to his executive or public responsibilities who does not give these questions his most careful thought, and who is not also willing to devote at least part of his time to public service. Edward N. Hurley, former chairman of the Federal Trade Commission, stated not long since that what business needed was constructive statesmanship. As to the truth of this, there may be great difference of opinion, but that the country's affairs have suffered from lack of constructive statesmanship there can be no difference of opinion, and business organizations should drive home this thought to the public mind in the most emphatic manner.

Politics and Business

"In a recent discussion of this subject that I had with a prominent Senator, he admitted that one of the great difficulties confronting the nation is that real politics and real business are not well acquainted; that neither fully understands the principles or the motive power that is driving the other side. Relative to this subject, the editor of one of the prominent magazines also said to me that education must be made to include a more serious study of the relations of law-making and business; that business men should co-operate with newspapers in giving publicity to matters of public interest, and thus help educate the politician to business needs. Another editor of a leading trade paper stated that there should be co-operation among trade journals on editorial policy in support of general business propaganda. Even Washington, as has been recently remarked, now recognizes the value of co-operation, and of a 'Gary dinner' when it is desirable to mark prices down. There is no doubt, I think, that the educational influences of co-operation for war, considered in connection with the Government's approval of the principle of co-operation for the promotion of export trade, will finally result in the approval of this principle for the regulation of general business operations. At least, we have made a start in this direction, for now, as one of the Allies, we are fully committed to co-operation for war. And will we not be automatically committed to the general scheme of co-operation after the war as a necessary condition to terms of peace?

"I would therefore urge upon all of you to 'speak, act and serve together' in the work of mobilizing public sentiment for co-operation, for the prevention of waste, for the conservation of our natural resources, for the encouragement of thrift, and for the general promotion of the public welfare. Let me also urge upon you to enlist for this service now, begin your campaign at home, educate your local chamber of commerce to our business needs, urge the co-operation of your local press, and also endeavor to educate your employees, as

some employers now do, by the distribution of leaflets on pertinent subjects through the pay envelope, or by the distribution of other literature, to the viewpoint that your interest is their interest. Furthermore, we should impress upon our representatives in both the House and Senate that their co-operation in this general welfare work will hereafter be considered by their constituency as part of their official obligation. As a preliminary step toward educating the employee of foreign birth in the fundamentals of citizenship, we should also give more active support to the Americanization movement by co-operating with the Y. M. C. A. and our local boards of education. As evidence of the practical character of this co-operative work, the Youngstown, Ohio, Americanization Committee reports that 144 for-

eigners, representing 16 different nationalities, were graduated during this month into full citizenship after passing all the educational tests required.

"As both 'big and little business' are loyally supporting the government in times of war, 'big and little business' should demand loyal support by the government in times of peace, for only by co-operation can we completely co-ordinate our working forces for the protection and advancement of the nation during either war or peace. The Honorable Charles E. Hughes sums up our national situation in these words: 'We have got the basis for success; what we now need is the motive power of unswerving loyalty and consciousness of national unity which will fill us with a dominant sense of patriotic loyalty to the United States.'"

Mr. Perkins and Others Respond

George W. Perkins, of New York, spoke of the "Man of the Future." He dwelt upon the necessity of the United States adopting a broader policy in reorganizing its business, if it is to take the leading place among the nations of the earth after the war. He spoke of the action of Germany in discarding the idea of intense competition at about the time the United States Congress passed the Sherman law. He said the business men themselves were largely to blame for the failure of legislation to meet conditions properly. He gave some illustrations of the ignorance of men of business as to public affairs and urged greater activity in politics on the part of manufacturers. He also discussed various phases of the food question.

Willis L. King, vice-president Jones & Laughlin Steel Company, was called upon by Judge Gary to say a few words in regard to James H. Hoyt, Cleveland, whose death occurred a few months ago. Mr. King spoke with deep feeling of Mr. Hoyt, as one who was greatly beloved by members of the institute, a man of kindliness, of wit and of wisdom, who had done well his part. He asked that the banqueters rise and stand for a moment in silence as a tribute to Mr. Hoyt, which was done.

Knox Taylor, president Taylor-Wharton Iron & Steel Company, High Bridge, N. J., heartily indorsed the idea of co-operation, which he said was needed more than ever before in order to insure the success of the Entente Allies. "The small companies are not afraid of the big ones," said Mr. Taylor. "We have not seen the great corporations abuse their power. If we had, we would have set up a mighty howl and we would have been heard. But now when we have no complaint to make, our voices in favor of co-operation should be heard. Big men are needed no less than big companies."

In closing Mr. Taylor very earnestly indorsed what

Mr. Topping had said about co-operation with the Y. M. C. A., which he said was doing a wonderful work not only in camp but in the industry of the country in bringing about better relations of employers and employees.

Harry G. Stoddard of the Wyman-Gordon Company, Worcester, Mass., delivered one of the best short speeches of the evening. He told how, some 16 years ago, when a young man, he was forcibly impressed by the idea of co-operation as advocated by Judge Gary at a time when it was not popular. The eleventh commandment, "Love ye one another," had been impressed upon business men and the idea of service and responsibility had been given prominence, causing a marked improvement in the relations of business men to each other and to the public. He spoke of the quick response of manufacturers to the call of the Government and predicted that a continuation of the work which they are doing would result in the recognition after the war of the dignity and rights of business, as well as during the war.

R. B. Carnahan, Jr., vice-president American Rolling Mill Company, Middletown, Ohio, and Emil Gathman of the Gathman Engineering Company, Baltimore, also made addresses heartily indorsing the idea of co-operation of manufacturers.

Judge Gary, in concluding the banquet, said: "This has been the greatest day in the history of the institute. As we do better and are better we shall be greater." The evening was concluded by the singing of the "Marseillaise" and the "Star-Spangled Banner." The elaborate decoration, in the colors of the United States and its Allies, of the grand ballroom of the Waldorf-Astoria, in which the banquet was held, and the singing of patriotic songs throughout the evening were prominent features.

Judge Gary on Business Conditions

Judge Gary, in the formal address delivered at the opening of the institute Friday morning, discussed conditions connected with the great war, but did not refer, as has been his custom for a number of years, to strictly business conditions. In a few introductory remarks, however, he discussed business as it is to-day and is likely to be during the next year or two. He first spoke, however, of the institute and said that the country is to be congratulated upon having such an organization. "The meetings," said Judge Gary, "are getting larger and more interesting from year to year. The original program has been somewhat modified; that is, it was intended in the beginning to make the institute to a large extent a business organization. The strictly business functions have been somewhat subordinated to the scientific. We have, however, no cause for complaint and there is no reason to feel that the original intention of the institute will not be virtually put into effect.

"We feel that discussions of business conditions must be more or less disregarded in the presence of the great issues that are before the world. We are all satisfied that business conditions are extraordinarily good. The demand for our products is great and the

prices offered and made by consumers are larger than they have been for many years. The prospects in the near future and as far as we can see are excellent. There is, of course, some anxiety, but we should remember that notwithstanding all the drain which will be made upon us in the prosecution of the war, immense amounts of money will be spent here by foreign nations, and there will be a larger volume of cash and cash assets than this or any other country has ever witnessed. With fair management, the outlook is that prosperity will continue for at least a year and perhaps longer, and we have reason for looking hopefully into the future." Following these preliminary remarks and also the formal address published elsewhere in this issue, Judge Gary said that he was glad to know that the program provided for informal discussions of his address under the five-minute rule. He said he would be happy to hear from any one who wished to speak.

Robert Hobson, vice-president and general manager Steel Company of Canada, Hamilton, Ont., brought greetings from the Dominion. "The last time I addressed a meeting of the institute," said Mr. Hobson, "I was very careful not to say anything that might

offend any member. Now I come to greet you as brothers in arms. Canada, with a population of 8,000,000 people, has already sent 400,000 men across the ocean, and of that number 88,000 have been killed or wounded or are missing. We are about to adopt conscription and send another hundred thousand, and perhaps more than that, to the battlefields. We feel cheered and encouraged because the great American republic has entered the great struggle for freedom and liberty."

Mr. Hobson was heartily applauded and Judge Gary then asked if there were any others who wished to speak. No one responded, and he said "All who would like to speak if they thought they could do justice to themselves and the great events of the time, will please rise." The members rose en masse and Judge Gary accepted the action as an expression of patriotism and enthusiasm. The reading of papers was then begun.

Allowances to Enlisting Employees

E. A. S. Clarke, president Lackawanna Steel Company, took a few moments at the opening of the afternoon session to present the matter of the provision which should be made for the care of dependents of employees who go to the front. A committee of the Chamber of Commerce of the United States has been

gathering information on the subject, and Mr. Clarke gave a brief summary of what this committee had learned. The experience of Great Britain has been drawn upon and in the statement emphasis was put upon the desirability of uniform procedure. It is considered highly desirable that employers wait for more light on this subject before announcing to their respective communities what they will do in making allowances to employees who enlist. The experience in Great Britain shows that a government allowance should be the basis and that what is done in addition should be by means of a popular fund open to general subscription. In Great Britain employers set out to deal liberally with their employees who were called to the colors, and in many cases the burden was borne almost to the point of financial distress. It is considered the part of wisdom for the United States to act in this matter in the light of the experience of Great Britain. There a government allowance was made and it is now proposed to increase this. The Chamber of Commerce committee pointed out the bad effects on the men at the front of the often widely differing allowances made by employing companies. Mr. Clarke urged that the members of the institute wait for the further development of a uniform plan for the handling of this matter in the United States.

Judge Gary on War Conditions

Judge Gary, in his formal address at the session Friday morning, said:

The people of the United States constitute a peace-loving nation. They abhor war and would go, have gone, great lengths to avoid it. They are considerate, reasonable and forbearing. They are not envious of their national neighbors. They neither seek nor desire anything that belongs to any other country. If they had an advantage over other nations, in any department of human endeavor, they would not unjustly profit by it. Their ambition is to cultivate good will and friendship and their hope is to avoid enmities. Their consistent purpose and effort have been to occupy an independent position among nations, unentangled and uncomplicated with alliances or associations that might interrupt the policy of aiding and never antagonizing others.

These observations are based on history. The record has been written and cannot be changed by any who may impugn the motives or conduct of our people. Such a citizenship when driven to self-defense by a barbarous despotism is apt to be the most terrible, even though civilized and human in its combativeness. This country is largely made up of men and women, who came here to live in peace and tranquillity, or the descendants of such; they wish to progress and prosper as the result of privileges which the exclusion of war always permits. The great majority, if not the total, of our inhabitants appreciate what our republic, with its protective insti-

tutions and manifold opportunities, means to every citizen; and with noble impulses they will in every emergency rally around and follow the Stars and Stripes, their emblem of honor, of liberty and of justice.

We did not desire, we persistently and consistently sought to avoid, trouble with Germany and her allies. We had always been the true friends of the Teutons until the ruling powers, for reasons not comprehended by us, forced us into the position of self-defense. We believed, as indeed it was admitted by the invaders, that they were reckless, lawless and cruel in their treatment of their neutral and unoffending neighbors, but as a nation we refrained from interference or even criticism. As human beings we suffered intensely as we learned of the outrages perpetrated upon the innocent victims of force and brutality; and still our nation, not for lack of sympathy, but rather on legal grounds, stood aloof. We were neither indifferent nor selfish, but our President, after full and careful consideration of all the facts and the construction of the rules of international law as determined by the best legal talent, decided he was obligated to remain silent and inactive. For one, I think his conclusions were warranted.

Even after the Central Powers trespassed upon the well established rights of the persons and property of individual American citizens, our Government was patient and unmoved to action, accepting the excuses and promises of the aggressors. As a nation we exercised more restraint than any large and powerful people ever before practised under provocation so great. Our chief executive indulged the hope for long and weary and suffering days that our entry into the pending war might be avoided. The wish was father to the thought; and this sentiment filled the minds of the majority of the people of the United States.

At last war was forced upon us. The President was compelled to conclude that we were intentionally attacked, that the honor and integrity of our country could no longer be maintained unless the gage of battle was accepted; and in this decision he was supported by the whole country. His clear, powerful, convincing and eloquent statement of the case and impeachment of the enemy will stand out in history as one of the greatest official declarations and also as fully justified by the existing facts and circumstances.

A Colossal Undertaking

But we have entered upon a colossal undertaking, justified only by the necessities of the case and on the highest moral grounds. It is doubtful if any of us fully realizes the strength of the enemy, even though we know his grim determination. His numbers, his preparedness, resources, devices, creative ability, methods, protective barriers, means of rapid mobilization and transfer of troops and supplies, are further advanced in effectiveness than any other army or armies have ever been. This concentration and perfection of the utilities of military strength should not be underrated.

ALL SHOULD BE WILLING TO SACRIFICE

The task which confronts the country is not confined to the army and navy, although they will be entitled to the larger part of the credit and glory if we succeed. They offer their bodies as a sacrifice, and they must have the undivided, unqualified support of all outside their ranks. The time, money and prayers of all civilians must be given for the soldiers. They bear the brunt; they are the shield for our safety. All of us are fighting in self-defense. This is our land and the flag is ours.—*Judge Gary's Address.*

Years of steady, active and studious, though secret, effort have brought about the creation of a giant, powerful, remorseless, conscienceless; and up to the present, this kind of a government, armed to this extent, seems to have an abiding conviction that it can overcome all opposition and sooner or later pursue a war of aggression and conquest.

Right Makes Might vs. Might Makes Right

And yet, the Allies possess an element of strength not appreciated—if it could under any circumstances be understood—by those who are in control of the armies of the Central Powers. The Allies are contending that right makes might; their enemies that might makes right. We are of the opinion that we possess a weapon that must prove all powerful. With this as the foundation and inspiration of our armies they are better able to utilize all the forces at their command. It will require time, skill, numbers, sacrifices and large sums of money; but nothing that we do not possess in abundance. For the reason that we are right and the enemy is wrong, we shall probably see other nations of strength and importance, now neutral in attitude, join the Allies, if the war shall be protracted. Some or all of the South and Central American republics, China, Spain, Scandinavia, Holland and Switzerland ought to come in and probably will before the Central Powers are allowed to accomplish what they attempt. These countries could not afford to permit their people to become subject to the dominance of a nation which considers force as the only consideration for aggression and expansion.

With the unprecedented and increasing wealth and the vast resources of the United States she is able to assist materially in providing the financial necessities for equipping multitudes of soldiers from other countries; and, if necessary, all these must be mobilized in the defense of a common and righteous cause. And as to equipment, the brains of the Allies, ourselves included, will in time be sufficient to match and overmatch the best talent that is possessed by our adversaries after many years of constant thought and study. Among other things it is conceivable that if the Allies had the best and most effective types of aircraft, outnumbering those of the other side five or ten to one, they could obtain and hold control of the air and in this way destroy the productive works, transports of troops and supplies, storage warehouses and other facilities for offensive and defensive warfare of the enemy, and thus materially increase the advantage now held by reason of numbers and resources. We may be sure our experts are giving due consideration to all the possibilities for improved machines and methods.

The pecuniary burdens to be imposed upon us will be very great. We knew in advance such would be the case. We must pay the enormous cost of mobilizing, equipping, supplying and moving our own armies; and we must advance money and provide supplies to our Allies in accordance with their necessities and our resources. We could not decline if we were disposed, for they are now fighting our battles and we are, with them, under the whole burden. We must never falter nor retrace our steps. Wherever or whenever the end is we must press forward with all our strength, might, minds and souls. The more vigorously we proceed within the limits of intelligence, the sooner will the end be reached.

Equitable Distribution of Tax Burdens

Some of us are complaining or criticizing because of the enormous taxes that are likely to be imposed. We are apt to consider ourselves as opposed by the legislative or executive departments of the Government, as if they were partisans, seeking to punish or at least unfairly treat the private individual. We do ourselves an injustice by harboring such thoughts. We can rightfully claim that the burden of taxation be equitably distributed; that all the people, after exempting the necessities of life, shall be compelled to contribute; and that there shall be no waste or extravagance in making expenditures. Taxes ought to be levied and distributed, if possible, so as to avoid clogging the channels of business prosperity. All this we may properly demand. Equitable distribution is fair and reasonable, and it makes all pecuniarily interested in the subject, including both the collection and the expenditure of the taxes levied. Less than this would tend to create classes—the worst thing for any country.

Now is the time to unite the whole country in a common cause. The soldiers are on a level, as they ought to be. All others should be on a level. Classes should be obliterated and also politics, localities and religious differences during war times at least. Opportunity

should be open to all; governmental burdens should be borne by all. With such an administration of governmental affairs we should be satisfied, however severe the drafts which are made upon us or upon the larger interests which we represent.

I lately spent a few days in Washington, and it was my privilege to meet a number of men who in legislative halls or executive departments are serving their country; and it is certain that all are actuated by the motive to fairly represent and protect the best interests of the country and all the people. Individuals are not influenced by politics. There are and will be differences of opinion concerning the various questions presented, as a matter of course, but these will be adjusted and the legislation finally passed will represent an honest endeavor to do what is proper.

Government is Co-operating With Business

You have heard some criticism concerning the conduct of the Government's business affairs. It has been said that confusion or at least lack of system or co-operation sometimes appears; but it must be remembered that there has been suddenly thrust upon the Government officials an enormous amount of business, extraordinary in volume and character, and the strength and capacity of all are taxed to the utmost and often beyond physical endurance. Besides, rules of law or of departments established to fit other conditions sometimes appear and prevent the exercise of judgment which would bring better results if more latitude were permitted. Officials in Washington are entitled to credit and praise for their management under existing circumstances, and so far I believe there is no just ground for severe criticism.

And then there is a disposition on the part of Government officials to co-operate with the business men in promoting the welfare of the country. This is what all of us have desired and advocated, and now we will probably have as much opportunity in this direction as we have ever desired. Just what will be the result in all the ramifications of the business involved remains to be seen. To the extent that the directors of this institute have been personally connected with these matters they have been well satisfied, except perhaps as to some of the prices in question.

B. M. Baruch, chairman of Committee on Raw Materials, Minerals and Metals of the Advisory Commission of the Council of National Defense, writing for himself and the Secretary of War, and also representing the Secretary of the Navy, requested your president to act as chairman and to appoint other members of a Committee on Steel and Steel Products, to co-operate with the Government; whereupon the matter was brought before the directors of this institute and such a committee was designated, consisting of the following: Elbert H. Gary, chairman; James A. Farrell, vice-chairman; James A. Burden, E. A. S. Clarke, Alva C. Dinkey, Willis L. King, Charles M. Schwab, John A. Topping.

The General Committee has appointed sub-committees as follows:

For Ascertaining Capacities and Supervising Allot-

WHAT WE ARE FIGHTING FOR IN THIS WAR

What are we fighting for? This question is asked and answered, in one form or another, by millions of people. I give an answer that seems to me to underlie all others: We are fighting to firmly establish and permanently maintain a basis whereby every international question in dispute must be determined in accordance with the principles of justice.

To bring this about, other questions which are obvious must be determined; but if the above mentioned basis is secured everything else necessary will have been or will be disposed of.—Judge Gary's Address.

ments of Orders to Manufacturers: James A. Farrell, E. A. S. Clarke, J. A. Topping, E. H. Gary, ex officio.

On Alloys: J. A. Farrell, E. A. S. Clarke, A. A. Fowler, E. G. Grace, E. J. Lavino, E. H. Gary, ex-officio.

On Iron Ore, Pig Iron and Transportation: H. G. Dalton, Frank Richards, Harry Coulby, George T. Dyer, W. T. Shepard, A. H. Woodward, Leonard Peckitt, Frank Billings, Amasa Mather, secretary.

On Sheet Steel: W. S. Horner, Charles Hadley, Walter Carroll.

On Scrap Iron and Steel: Eli Joseph, Samuel Deutsch, Vernon Phillips, Joseph Michaels.

On Pig Tin: John Hughes, E. R. Crawford, Edwin Groves.

On Tin Plate: J. I. Andrews, E. R. Crawford, E. T. Weir.

On Tubular Goods: James A. Campbell, chairman. The committees meet regularly and are devoting much time to the work involved.

They have, with other work, been engaged in mobilizing the resources of the different producers of steel, such as the Government requires for its purposes, and the statistics are in the possession of the Secretary of the Institute.

The Secretary of the Navy submitted a program for 1917 for plates, structural shapes and bars needed for ships, and after considerable negotiation, contracts were closed in behalf of the producers on the basis of \$2.90 for plates and \$2.50 for structural shapes and bars. We were of the opinion that in view of present costs and other conditions we should receive larger prices, but in the spirit I have referred to the proposition of the Government was accepted. As costs of production are advancing on account of increases in wages, taxes, prices of certain raw materials, etc., it is expected the Government will be willing to increase its purchasing prices accordingly.

Iron and Steel Fraternity Patriotic

The Iron and Steel fraternity, represented by this Institute, will be actuated by the highest conception of patriotic duty with respect to the requirements of the Government. We will cheerfully bear our full share of the load which must be carried until there is realized a complete triumph over the hosts of aggressive, desperate and inhuman autocracy. Personal interests will yield to the necessities of the country we love.

Papers Presented at the Sessions

"Recent Installations of Large Turbo Generators," a voluminous and important paper, was presented at the morning session by Richard H. Rice, engineer General Electric Company, West Lynn, Mass. D. S. Jacobus, advisory engineer Babcock & Wilcox Company, read a discussion of the paper, emphasizing Mr. Rice's important work in this field. The discussion by Alexander Dow, president Detroit Edison Company, Detroit, Mich., was read by C. F. Hirshfeld, chief of the research department. Some interesting data as to the recent costs of a steam turbine station, especially as affected by the rising cost of coal, were presented. The paper by Mr. Rice and the discussions will have further notice in THE IRON AGE in a subsequent issue.

An unusually valuable paper, of a historical as well as a practical nature, was that of President R. P. Lamont, American Steel Foundries, Chicago, Ill., a large part of which is published elsewhere in this issue. R. F. Flintermann, president Michigan Steel Castings Company, Detroit, discussed the paper informally, stating some of the difficulties in making castings by the crucible and converter processes and giving his reasons for adopting the electric process. He also presented some of the advantages of his "reversed duplexing" process, in which he supplements a basic electric furnace with an acid electric furnace. These points were more fully covered in his paper published in THE IRON AGE, May 10, 1917.

A discussion of Mr. Lamont's paper was furnished by S. P. Bush, president Buckeye Steel Casting Company, Columbus, Ohio, which was not read. It was substantially as follows:

Mr. Bush's Discussion

Mr. Lamont has very thoroughly presented the history and development of the manufacture of steel castings, and has touched also upon their structural and economic value. To give a further idea of this value it may be pointed out that to-day the truck superstructure of freight cars, passenger cars, locomotives and locomotive truck frames are constructed almost exclusively of steel castings; in fact, the practice may be regarded as standard. This fact must convey the thought that there can no longer be any doubt as to the reliability of castings when produced according to practice and specifications now prevailing. It may be said, too, that castings for these purposes are produced almost exclusively by the basic process.

It is true, as Mr. Lamont says, that castings produced by the acid process are generally regarded as less subject to certain disadvantageous elements, such as porosity, but this is not to say that castings made by the basic process cannot be produced of equal quality in every respect with those made by the acid process. As an illustration of this, some years ago when the manufacture of large steam turbines was in process of development it was thought that the frames or discs could not be constructed otherwise than by building up with rings, inasmuch as complete freedom from such defects as porosity was required; in fact, entire absence

of any doubt as to the reliability of the structure was required. The production of these frames or discs was undertaken by one steel castings concern with this requirement in view, and in a comparatively short time these parts were produced by casting to the entire satisfaction of the turbine builders. The surfaces had to be highly finished, to be absolutely free from any surface imperfection, and soundness in every particular was essential.

To-day these parts are produced by no other method than by casting, and quite as often by the basic process as by the acid.

As to the structural value of steel castings, it is only necessary to point out that such a structure as a car or locomotive truck must necessarily be greatly improved by the great reduction in the number of parts required to make a complete structure. Further than this, the casting has a great advantage in effecting a reduction in weight varying from 20 to 50 per cent, which advantage, of course, is reflected in reduction of costs.

Question of Annealing

For the purposes above set forth, the effect on the reduction of cost must necessarily have been very considerable. Mr. Lamont has spoken of removing internal stresses, and in this connection it may be interesting to point out that in the case of such a piece as a locomotive driving frame it is generally conceded that as compared with a forging, the chances of internal stresses remaining in the structure after finishing are generally regarded as considerably less. Of course, casting lends itself particularly to the production of irregular shapes. The term annealing as applied to castings is often a misnomer. In most cases the annealing process is nothing more than a heat-treating process by which the structure of the steel is changed. Sometimes, however, the process includes not only changing the structure of the steel, but of removing internal stresses and of increasing ductility.

It is yet something of a question whether a casting cannot be produced which with proper heat treatment alone will not closely approximate a forging in physical quality.

Undoubtedly there are possibilities in the art that are yet capable of much development, and it does not seem at this time out of the way to predict that much that is now required in the way of forged material will in the not far distant future be produced by casting.

Afternoon Session

At the afternoon session, which was opened by the singing of the "Star Spangled Banner," an admirable paper on "The Relative Merits of Forming Steel by Pressing, Hammering or Rolling" was read by John Lyman Cox, engineer Midvale Steel Company, Philadelphia, which will be published in a later issue of THE IRON AGE. "Surgical Discoveries of the War and Their Application to Industrial Accidents, Humanitarian and Economic Features" was the subject of a paper by Dr. William O'Neill Sherman, chief surgeon Carnegie Steel Company, Pittsburgh. Lantern slides which showed the marvelous progress made in the treatment of

wounds and burns by Dr. Alexis Carrel and Dr. H. D. Dakin, working in their Compiègne hospital under the auspices of the Rockefeller Foundation, accompanied the reading of Dr. Sherman's paper, which made a profound impression on all present. "The Chemical Reactions of Iron Smelting" was the subject of a paper by Walther Mathesius, superintendent blast furnaces, Illinois Steel Company, South Chicago, Ill. It was discussed by H. P. Howland, superintendent blast furnaces Wisconsin Steel Company, South Chicago, Ill.

NEW ORGANIZATION CREATED

The Society of Industrial Engineers Launched at Chicago Meeting

At a meeting held in Chicago, May 26, following the three-day national conference of the Western Efficiency Society, the Society of Industrial Engineers was launched. The meeting of organization was presided over by Willard E. Hotchkiss, dean of the Northwestern University School of Commerce, Chicago. The objects of the new organization are to provide a vehicle whereby the best minds can be enlisted to aid the Government in its present hour of need; and whereby the best minds, working together, can promote efficiency and industrial management.

Seven classes of membership were created. These include patrons, life members, industrial engineers, professional technical engineers and accountants, managing executives of companies, educators, writers and students. A patron will pay \$100; all others, except students, \$25 initiation fee and \$10 dues, while the dues of students will be \$5, with an initiation fee of \$10.

Charles B. Going, who for twenty years was editor of the *Engineering Magazine*, was elected professional leader. Mr. Going made an address in which he said that not only is this country facing a graver situation than ever before, but that the conditions which prevailed prior to the war will never be restored. In the future the human factor must be given more consideration, and employees must abandon tactics which have brought discredit upon them.

Committee Appointments

Committees were appointed as follows:

Organization: I. A. Berndt, F. M. Simons and A. B. Segur, Chicago; Harrington Emerson, New York, and M. L. Cooke, Philadelphia.

Membership: C. E. Knoepfel, New York; F. B. Gilbreth, Providence, R. I.; Charles Day, Philadelphia, and W. S. Ford and H. T. Kessler, Chicago.

Constitution: Willard E. Hotchkiss, Chicago, chairman; A. Russell Bond, New York; H. P. Porter, Detroit; D. S. Kimball, Ithaca, N. Y., and Mark Cresap, Chicago.

Finance: H. T. Kessler, S. T. A. Loftis, E. L. Ryerson, W. R. Bassett, Chicago, and W. H. Greul, Otis Elevator Company, New York.

Nominating: H. P. Dutton, S. E. Stout, C. H. Burns, Richard Waterman and G. C. Dent, all of Chicago.

Plan of Organization

The organization committee reported that the members should elect a board of directors, and that the board should elect a president, the latter to be the executive of the organization. The president, according to the plan, is to nominate directors, who will have the title of vice-president, and who will have charge of three sub-divisions, known as promotion, advisory and performing. In addition, a vice-president will be elected who will act for the president as occasion demands, the other vice-presidents not having that power.

After an all-day session the business of organization had not been concluded, and recess was taken until the evening, the nominating committee being instructed to report at that time on its selection of names for the directorate.

Large Attendance at Efficiency Conference

The conference of the Western Efficiency Society was attended by delegates from all parts of the country;

some of the meetings being attended by over 1000 persons. At the opening session, C. E. Knoepfel, representing Howard E. Coffin, of the Advisory Committee, Council of National Defense, gave an address on "The Importance of the Human Factor in Industrial Preparedness." The conference was opened by H. Thorpe Kessler, president of the Western Efficiency Society. At the first session, Harrington Emerson gave an address on "Stimulating the Management." On Tuesday evening John P. Frey, editor *International Molders' Journal*, spoke on the topic "Labor's Viewpoint." Other topics discussed were the training of the coming generation of workers and executives; employment problems and labor problems. Friday evening, Charles R. Van Hise, Ph. D., president University of Wisconsin, gave an address on "Governmental Control of Industries." Harry D. Porter, of the Detroit Executives' Club, spoke on safety first. Frank B. Gilbreth had a paper relating to the re-education of cripples to put them on a self-sustaining basis.

At Saturday night session of the Society of Industrial Engineers 15 directors were elected and Charles Buxton Going, New York, was chosen chairman, pro tem. A meeting of the directors was called for June 15 at Washington, D. C.

Metal Branch, National Hardware Association

The sixth annual meeting of the Metal Branch of the National Hardware Association will be held in the William Penn Hotel, Pittsburgh, on Friday and Saturday, June 1 and 2.

The program for Friday morning includes an address by W. L. Monro, American Window Glass Company, on "The General Situation," and discussions on "The Outlook for the Future," led by W. W. Justice, Jr., N. & G. Taylor Company; "Are Prevailing High Prices Curtailing Demand and Have Competing Materials Had Similar Advances?" led by O. T. Ross, Delphos Mfg. Company, and "How Has the Percentage of Profit Obtainable Been Affected by Present High Prices?" G. S. Winders, Van Camp Hardware & Iron Company.

Discussions continue during the Friday afternoon session with these topics and leaders: "Are the Manufacturers Filling Orders as Promptly as Possible?" E. L. Westwood, Wheeling Metal & Mfg. Company; "Effect of Co-operation Between Jobbers and Manufacturers Upon the Future of the Industry," George W. Kreer, American Sheet & Tin Plate Company; "What Steps Can the Jobber Take to Prevent Customers Cancelling Contracts?" W. E. Waters, Merchant & Evans Company. C. L. Pollock, Apollo Steel Company, will deliver an address on "Future Conditions of the Galvanized Sheet Market."

At the buffet smoker and supper, Friday evening, Col. H. P. Bope, Carnegie Steel Company, will be the principal speaker, discussing "Our Present Problems."

At the closing session, Friday morning, Alfred Marshall, Marshall Brothers & Company, will present "A Brief History of the Tin Plate Business in America," and F. O. Schoedinger will discuss "What Changes in Buying and Selling Are Necessary as a Result of Present Conditions?"

Leases Mine, Buys Furnace

CHICAGO, May 28.—The Miami Metals Company, formerly the Miami Products Company, Chicago, has leased the Zimmerman iron mine in the Iron River district, Michigan, and bought a blast furnace at Goshen, Va. To operate the latter, which will run on iron, the company will organize a subsidiary company under the laws of Virginia. The Zimmerman ore will be shipped to Goshen. The furnace which the company leases from the Iroquois Iron Company will continue on ferromanganese as heretofore. The Miami Metals Company has removed to 1500 Tower Building, Chicago.

The Cincinnati offices of the W. F. Davis Machine Tool Company will be removed from the Greenwood Building to the Union Central Life Insurance Building. H. M. Moore and P. J. Westphal are in charge.

LEATHER BELTING

Considerations in Purchasing for Machine-Shop Service

BY LOUIS W. ARNY*

A peculiar condition exists in the machine and railroad shops of the country in the purchase and use of their leather belting, and it fairly may be said that the majority of them are buying and using leather belting of a very inferior character. In some cases this is due to a deliberate selection of cheaper grades, but in most of them it is due to the ignorance of the purchasing authorities, the attraction of lower prices, and the delusion that quality can be secured without paying an adequate price for it. One of our important railroads has said in substance that they find certain second and third qualities quite sufficient for their requirements.

The practice in leather belting in most of these shops is based, at least in part, on the study on this subject originally formulated by Frederick W. Taylor, and by his coadjutor and successor, Carl G. Barth, and these men after considerable belting experimentation determined upon a tension equivalent to about 70 lb. per sq. in. as that giving most satisfactory results. It was understood that this tension was much below the actual capacity of the belts, but the purpose was to adopt a tension that would be such as to reduce to a minimum the labor and attention of maintaining it, and of securing a long life for the belt, and it was intended that by the use of leather belts of high grades, the utmost economy would be attained; this was doubtless the result, and Mr. Barth to-day after a good many years of experience with this tension, is still insistent that good qualities of belting only be used.

Working Tension Too Low to Measure Quality

But the use of this low tension, though conducing to the economy of operation and the long life of the belt, is so low as to make possible, with temporarily successful results, the use of much inferior qualities of leather belting, and these lower grades, introduced into the shops either intentionally, as with the railroad mentioned, or ignorantly through a bad purchase, have been sufficient to keep the pulleys in a state of revolution for a time, and their subsequent performance has been overlooked or forgotten. This is more particularly true where there exists so large a gap between the purchasing and operating departments as is usual with the railroads. Unless the leather belts supplied fail to do their work, the operating department is not inclined to make trouble with the purchasing department, shutting their eyes to length of life.

The idea that the cheaper grades of leather belting can produce the same economical results as the better qualities is just as fallacious as the same thought in application to other materials. A good leather belt is capable of such a long life under reasonable conditions, and real economy is so dependent upon length of life, that the use of inferior qualities made from belly and shoulder portions of the hide is pure extravagance, and yet many of our best shops are filled with the worst junk that the leather beltmaker can put together.

No Accepted Test for Belting

Leather belting does not lend itself to the mental processes of the average purchasing agent. It is a specialty which is poorly understood even by those most practical in its use. It is not standardized as are some other products. It cannot be bought as a standardized article on price only, and when the purchasing agent places his order or his contract with the lowest bidder, he gets only and not a particle more quality than he pays for. The lowest bidder is always the one least qualified to supply the goods desired. The fact that the receivers and the operating department are not qualified to determine the quality of the goods delivered from their appearance or from any tests which they are

capable of applying is an open invitation or possibly a defiance to the lowest bidder to come in and defraud them. There will come a time when this condition will be changed, for the leather belting manufacturers through the Leather Belting Exchange, in connection with the Mellon Institute of Industrial Research, is at work in an effort to produce specifications that will really specify, and the results of which may be identified on delivery. At this time this is impossible, and the present variety of specifications for leather belting is ridiculous because no man can tell on delivery whether the goods comply with them or not.

There is a large opportunity for the machine and railroad shops of the country to make material savings in their belting expense by the use of better qualities. It is possible for them to secure a better efficiency from those belts in operation; to reduce the costs of care and maintenance, and to reduce the costs of replacement. Leather is a practically indestructible material. It does not corrode, oxidize, ferment or crystallize and time produces no effect upon it. There are records of belts which have carried their loads for 30, 40 and even 50 years and are still running, after having traveled millions of miles, and this wonderful efficiency should be secured for the machine and railroad shops. But it must be understood that the maximum efficiency and length of life can be secured only from use of the first quality, and not from the second and third quality belts bought because their first cost is smaller.

There need be little trouble about securing a good quality of leather belting for use in these shops if the purchasing departments will go about it properly. As previously explained, it cannot be bought on specification or price, but there are many reputable manufacturers whose brands and trademarks can be depended upon and a reliance upon recognized brands, and the payment of a sufficient amount of money, will secure the desired qualities.

Osterberg Tin Mill to Start

The American Steel Company, Pittsburgh, M. B. Kelly president, which acquired possession of the plant of the Osterberg Tin Plate Company at Waynesburg, Pa., early in the year, has made material improvements and additions to the plant. There are four hot tin mills, three cold mills, four sheet and four pair furnaces, a three-arm Mesta pickling machine, six tinning stacks, and other complete equipment. The company has also bought considerable adjacent land, which it contemplates using for extensions. There is now on the ground a supply of pig tin and palm oil, and the company will begin to receive sheet bars in the near future, so that the plant may be put in full operation on June 1 or shortly after. It will have a monthly capacity of about 25,000 base boxes of tin plate, and part of the product has been sold for July, August and September delivery. Hugh Scanlon, now with the Phillips Sheet & Tin Plate Company, Weirton Works, Weirton, W. Va., has resigned, to become general manager of the Waynesburg mill.

The Charles A. Schieren Company, New York, has recently opened branch offices at 72 Congress Street, West, Detroit; 18 South Broadway, St. Louis; 475 South Main Street, Memphis, and 272 Marietta Street, Atlanta. Branch offices are also maintained by the company at New Orleans, Boston, Philadelphia, Pittsburgh, Chicago, Denver and Seattle, for the sale of its belting and leather products, and it has jobber representation in all of the principal industrial centers as well.

The Link-Belt Company, Chicago, has recently had printed in colors a portion of President Wilson's proclamation, and is circulating it as a hanger. Copies may be had on addressing the company's Chicago plant.

Vogt Bros. Mfg. Company, Louisville, Ky., has taken contracts for 600 tons of the triple expansion Government engines for merchant vessels, and expects to take contracts for more shortly.

*Secretary Leather Belting Exchange, Forest Building, Philadelphia.

Mild or High-Tension Steel for Reinforcing

The question of "High-Tension Versus Mild Steel for Reinforcing Concrete" was recently presented before the Society of Engineers (British) by A. W. C. Shelf in which he advocated the use of steel bars, "physically developed" by cold twisting, for reinforcing concrete. Figures were given of a number of tests from which it was claimed that the effect of twisting steel bars was to increase considerably the ultimate strength of the bar, and from this it was argued that the regulations of the London County Council regarding reinforced concrete are retrograde, inasmuch as a maximum working stress of 16,000 lb. per sq. in. only is allowed, however high the yield point of the steel may be. The author claims that by scrapping previous ideas we could save 20 to 25 per cent of the steel now employed in constructional reinforced work.

What would be the effect if all steel employed for reinforced concrete were "physically developed" and had a working stress of 20,000 lb. per sq. in.? First, a new industry would be created requiring labor. The initial labor for the twisting machines would not be great, and would soon be returned by the extra profit the manufacturer would get on every ton of steel. The cost of physically developed bars was put at 30s. per ton more than the cost of plain round mild steel bars, but only 80 tons of the former would be required against 100 tons of the latter, so that to obtain an equally strong structure a substantial economy would be effected by the employment of physically developed bars. There would also be less weight of steel to handle and less cost for carriage, while the bars, owing to their higher buckling resistance, would be less liable to get bent or damaged in transit.

The main points claimed for physically developed low-carbon steel bars for reinforced-concrete work are:

A higher yield point and ultimate stress, both in tension and compression.

A higher buckling resistance, which gives greater elasticity to the concrete structure.

A safe working stress of 20,000 lb. per sq. in., giving an economy in steel of 20 per cent., compared with a stress of 16,000 lb. per sq. in. for mild-steel bars.

Greater efficiency with 20 per cent less steel.

Less cost, owing to less weight of steel being required.

The creation of a new industry which would entail further employment of labor.

The steel saved could be used for other purposes, and thus help to keep the machinery which has been laid down for munition purposes fully employed after the war.

The discussion was taken part in by a number of structural engineers, and the main point turned upon the adequacy or otherwise of the London County Council regulations. It cannot be said that the balance of opinion was in favor of the author's contention, although there are a large number of his twisted bars in use and said to be giving every satisfaction. It was pointed out that the London County Council regulations were framed after consultation with the representative engineering institutions, such as the Royal Institute of British Architects, the Concrete Institute and the Institution of Civil Engineers, and that they are so drafted that there is no difficulty in getting them revised when it is shown that it is essential this should be done. Many arguments, however, were brought forward by structural engineers to show that this time had not yet arrived.

The question of an alteration in the stresses allowed in steel used for the purpose of structural work is now under consideration of the Engineering Standards Committee and until a new specification is issued it would appear from the remarks made that there is very little likelihood of a general adoption of the author's twisted bars.

At the same time it was generally admitted that the facts brought forward in the paper made out a case for further inquiry as to the advantages of the use of the bar recommended. One speaker referred to works costing in the aggregate some £500,000 in which such bars have been used with every success and for work abroad the saving in freight has been found to

be considerable. At present, however, there is considerable divergence of opinion, with the balance against the author. It was stated, for instance, that the bar increased the stress in the concrete, the cost of which counterbalances the advantage of using the twisted bar. Then again, it is felt to be a disadvantage from the consulting engineer's point of view that to adopt the twisted bar would mean having to specify one particular firm's product, and this is felt by most consulting engineers to be undesirable. However, the author has had a certain amount of success hitherto, and the real position is that, whereas he has not yet convinced the bulk of structural engineers of the soundness of his arguments, he has, on the other hand, produced a feeling among them that there may be something in them.

Newport Companies Doubling Capacity

The Andrews Steel Company and the Newport Rolling Mill Company, Newport, Ky., are making additions to their plants that when completed will practically double their present outputs. At the Andrews Steel Company's plant, two 3200-hp. Westinghouse turbine engines direct connected to generators are now being installed and when these units are in service all machinery in both plants will be electrically driven.

The Newport Rolling Mill Company has let contract to the Toledo Bridge & Crane Company for a one-story addition to its plant that will be 108 x 160 ft. This floor will house three 30 x 38-in. sheet mills and one 30 x 56-in. sheet mill to be installed by the Wheeling Mould & Foundry Company. Later five sheet mills will be added to the plant, making a total of 19 mills. At the present time the company is operating 10 sheet mills.

The Wheeling Mold & Foundry Company, Wheeling, W. Va., has received a contract from the Newport Rolling Mill Company for three trains of 30-in. and 32-in. roughing and finishing mills to include 21 stands. All these mills are to have cast-steel housings, and will be of the latest design. The contract also calls for four cold sheet mills.

New Central Supply Warehouse for Army

Negotiations have just been closed whereby the Central Supply Warehouse of the United States Army will be located at Iron and Thirty-sixth Streets, Chicago, in what is known as the central manufacturing district. Largely through the activity of Col. A. D. Kniskern, depot quartermaster of the Central Department of the Army, Montgomery Ward & Co. have vacated a five-story structure containing 150,000 sq. ft., in which supplies will be stored, and larger offices afforded for the quartermaster's department. The new location is flanked on both sides by the switch tracks of the Chicago Junction Railway, and is also accessible to the steamship lines using the Chicago River, whereas at the old location in Ontario Street, all shipments were handled by teams. To assist the Government, the National Wool Warehouse & Storage Company diverted its consignments to Philadelphia, then turned over its warehouse to Montgomery Ward & Co., enabling the latter company to place its warehouse at the disposal of the Army Department.

Sued by the French Republic

Suit has been brought in the Federal Court at Indianapolis by the Republic of France, seeking \$46,000 damages from the Kokomo Steel & Wire Company of Kokomo, Ind., for breach of contract. The complaint states that the republic, through its authorized agent, J. P. Morgan & Co., entered into two contracts with the Kokomo company for 3000 tons of barbed wire at \$2.98 per 100 lb. and 2000 tons at \$2.70; that the company failed to deliver on one contract 1,047,774 lb., and on the second about 4,400,000 lb.; that both contracts were entered into Aug. 23, 1915, for delivery early in 1916, and that in the meantime barbed wire had advanced in value to \$3.98 per 100 lb., entailing a heavy loss to France on the contracts.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

INJURY CAUSED BY CO-EMPLOYEE'S NEGLIGENCE.—The rule of law that an employer is not liable for injury to one workman caused by negligence of a "fellow servant," unless the employer was negligent in retaining the latter in the face of incompetency or habitual carelessness, applies only to employees engaged in the same department of the employer's operations. Hence, where an iron works company was engaged in converting a sailing vessel into an oil barge, an employee operating an oxy-acetylene gas engine on the deck of the vessel to furnish gas to workmen in the hold was not a fellow servant of a laborer engaged in removing a davit on the same deck, as affecting liability of the common employer for fatal injury sustained by the engineer through negligence of the laborer in handling the davit. (Louisiana Supreme Court, *Wirth vs. Alex Dussel Iron Works*, 74 Southern Reporter, 551.)

VALIDITY OF MACHINERY PATENTS.—Public use of a machine with permission of the inventor for two years before his application for a patent conclusively establishes his abandonment of any right to a patent, unless it appears that such use was for experimental purposes only. (United States District Court, Eastern District of Pennsylvania, *Wendell vs. American Laundry Machinery Company*, 239 Federal Reporter, 555.)

COMPENSATING WORKMAN FOR LOSS OF EYE.—Where an employee sustained an injury to one of his eyes through getting hot sand in it in the course of his work, necessitating removal of the eye, he was entitled to an award under the Michigan workmen's compensation act as for entire loss of that eye although its vision had previously been so impaired by another accident that he could merely distinguish through it between light and darkness and detect approaching objects, and although the complete loss of the eye did not affect his earning capacity after a lapse of a few weeks. (Michigan Supreme Court, *Purchase vs. Grand Rapids Refrigerator Company*, 160 Northwestern Reporter, 391.)

WAIVER OF BUYER'S CLAIM—LIABILITY ON NOTE.—By renewing a note given for the purchase price of machinery the buyer waives any claim for damages on account of any defective condition of the machinery known to him at the time of executing the new note. The president of a corporation who writes his name on the back of the company's note at the time of its execution as an accommodation to the corporation is liable as a surety for payment and not as a general indorser. (Texas Court of Civil Appeals, *Houston Transportation Company vs. Paine*, 193 Southwestern Reporter, 188.)

DELIVERING GOODS WITHOUT PRODUCTION OF BILL OF LADING.—Where goods are shipped by a seller under a bill of lading to his own order, with the customary provision for notice to the buyer and draft on the latter with bill of lading attached, the carrying railway company becomes liable to the shipper on making delivery to the buyer without surrender of the bill of lading and on the buyer failing to pay the draft, regardless of any claims the latter may have against the shipper. In a suit by the shipper against the carrier for such unauthorized delivery to the buyer, the carrier is not entitled to inject into the controversy any question of rights as between shipper and buyer, although the carrier may protect itself in making delivery without production of the bill of lading, by requiring the buyer to give a bond to indemnify the carrier for any resulting liability to the shipper. (Louisiana Supreme Court, *Harwood-Barley Manufacturing Co. vs. Illinois Central Railroad Co.*, 74 Southern Reporter, 569.)

VALIDITY OF ARKANSAS PROMISSORY NOTES.—Under the laws of Arkansas a note given for the price of a patented article is invalid unless executed on a printed form showing upon its face that it was given for a patented article. But where the note is not produced in a suit brought on it by the owner, because it has been lost or stolen, the maker, in order to defeat liability on the note under the law mentioned, must affirmatively

show that the statute was not complied with. (Arkansas Supreme Court, *Jaggers vs. Sparks*, 193 Southwestern Reporter, 67.)

CONCLUSIVENESS OF WRITTEN TERMS OF CONTRACT—TIME FOR SHIPMENT.—An engine was sold for shipment from Suffolk to Norfolk, 20 miles away, under a memorandum of agreement calling for shipment at "once," "f. o. b. Suffolk." The seller knew that the buyer needed the engine at once, and the buyer knew that a car had to be procured before shipment could be made. Two days' delay arose in obtaining the car and the buyer refused to accept delivery, buying another engine elsewhere. In an action by the seller to recover on the contract, the Virginia Supreme Court of Appeals holds that under the circumstances the seller's tender of delivery within two days and as soon as a car could be procured was timely under the contract. It is further decided that since the written contract plainly manifested an agreement for delivery f. o. b. Suffolk, defendant buyer was not entitled to rely upon a claimed verbal understanding that the engine was to be delivered by plaintiff seller at defendant's place of business in Norfolk. Where a contract calls for delivery f. o. b. place of shipment, without any qualifying terms, the courts will interpret the agreement as providing that the subject of sale was to be placed on board cars without expense or act of the buyer, and that as soon as so placed the title passed to the buyer, with transportation at his risk so far as concerns the parties to the contract. (Lawson vs. Hobbs, 91 Southeastern Reporter, 750.)

LIABILITY OF CONNECTING CARRIERS.—Where an interstate shipment has been carried over connecting lines of railroad, and suit is brought by one of the carriers other than the initial one to recover freight charges, the shipper is not entitled to offset a claim for damages on account of injury to the goods in transit without showing that the loss occurred on the suing carrier's line; it being only the initial carrier who is liable for loss anywhere in transit. (United States District Court, Southern District of Georgia, *Johnson-Brown Company vs. Delaware, Lackawanna & Western Railroad*, 239 Federal Reporter, 590.)

Advance in German Steel Prices

The Zurich correspondent of the *London Economist* says:

At the beginning of April this year, all Swiss importers of German steel received a polite letter, dated March 31, in which their German purveyors of steel state that, by order of the "Verband," the price of steel for Swiss buyers since April 1 is increased for all contracts made through the "Verband" by \$6 a metric ton, and for contracts made before the creation of the "Verband" by £8 a ton. The German government not only forces German exporters to require payment in Swiss currency, and deliver the money to the Devisen-zentrale of the Reichsbank, but also forces them to break existing contracts, and from one day to another raise the price by 80 to 125 per cent, according to quality. It is not surprising, therefore, that Swiss manufacturers are making preparations for the import of steel from the United States.

Analyzed Samples of Iron and Steel

The Bureau of Standards, Washington, D. C., now has ready for distribution its high phosphorus standard analyzed Iron E No. 7, which is typical of the irons from the Alabama area. The analysis is as follows: Carbon, 2.17; graphite, 1.82; combined carbon, 0.38; silicon, 2.21; titanium, 0.095; phosphorus, 0.862; sulphur, 0.051; manganese, 0.444; copper, 0.021; chromium, 0.014; nickel, 0.016; vanadium, 0.073. The renewal, No. 12b, of basic open-hearth steel approximately 0.4 carbon is also ready. Until printed certificates can be secured the above samples will be issued with provisional certificates without details of analysis or description of methods. A new sample of Bessemer steel, with approximately 0.1 per cent carbon, to replace No. 8a, is now in process of analysis.

CANADA'S STEEL OUTPUT IN 1916

Ingots and Pig Iron Made a New High Record

The statistics of production of iron and steel in Canada in 1916 as published by the American Iron and Steel Institute in the past week show a marked increase over the output of the preceding year. Pig iron production was 1,069,541 gross tons against 825,420 gross tons in 1915. The production of steel ingots and castings last year amounted to 1,286,509 tons against 912,755 tons in 1915. The production of pig iron by grades in 1916 and the four years preceding was as follows, gross tons:

	Basic	Bessemer	Foundry	All Other	Total
1912.....	489,799	228,742	194,208	129	912,878
1913.....	558,524	227,662	225,231	3,791	1,015,118
1914.....	331,456	184,053	174,346	16,117	705,972
1915.....	660,369	13,714	125,769	25,569	825,420
1916.....	851,453	12,575	181,748	23,765	1,069,541

The production of steel ingots for last year was 1,255,196 tons and of steel castings 31,313 tons. The production of ingots and castings by processes in the past five years was as follows, gross tons:

	Open-Hearth	Bessemer	Other Kinds	Total
1912.....	645,062	207,569	400	853,031
1913.....	768,663	273,391	449	1,042,503
1914.....	556,910	186,158	284	743,352
1915.....	884,736	22,521	5,498	912,755
1916.....	1,245,458	10,968	30,053	1,286,509

Finished Rolled Products

The production of finished rolled products in Canada in 1916 was 76,478 tons of iron and 887,332 tons of steel, making a total of 963,810 tons. This compares with the high record of 967,097 tons in 1913. The distribution of finished rolled forms of leading products for the past five years is shown below:

	1912	1913	1914	1915	1916
Rails.....	423,885	506,709	382,344	209,752	81,497
Structural shapes and wire rods...	64,082	68,048	59,050	114,829	174,490
Plates and sheets, nail plate, merchant bars, tie-plate bars, etc....	373,257	392,340	218,125	328,737	707,823
Total, gross tons.....	861,224	967,097	659,519	653,318	963,810

It will be noticed that rail production last year fell off heavily, due in large part to the extraordinary demand upon steel works for war steel. In the preceding year Canada shipped a considerable quantity of rails into the United States.

The production of iron and steel cut and wire nails in Canada in 1916 amounted to 1,757,000 kegs of 100 lb., as compared with an estimated production in 1915 of 1,636,000 kegs. Cut or wire nails were made last year by nineteen works in five provinces.

The production of finished angle splice bars, tie plates, fish plates and other rail joints and fastenings in Canada by rolling mills and steel works in 1916, all steel, not including spikes, bolts, nuts and similar fastenings, amounted to 6479 gross tons, as compared with 9406 tons in 1915, 34,165 tons in 1914, 54,839 tons in 1913 and 52,157 tons in 1912.

The total production of cast-iron gas and water pipe and fittings and cast-iron soil and plumbers' pipe and fittings in Canada in 1916 is estimated at 43,850 net tons of 2000 lb., as compared with an estimated production in 1915 of 53,700 net tons, a decrease of 9850 tons.

Will Meet in Pittsburgh

The American Boiler Manufacturers' Association, of which H. N. Covell, 191 Dikeman Street, Brooklyn, N. Y., is secretary and treasurer, will hold its annual convention at the William Penn Hotel, Pittsburgh, June 25 and 26.

President Wilson's address of April 2, 1917, before Congress, has been printed in an unusually attractive form for more or less general distribution by the Westinghouse Electric Mfg. Company. To the address has been given the title, "A Plea for Defense of Human Rights and Liberty."

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THE IRON AGE

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Co-operation Redivivus

Between 1907, the year of the first Gary dinner, and 1917 has stretched a decade that the American steel trade will long remember. At its beginning, just after the panic, when steel manufacturers stood in fear of a violent drop in prices, co-operation was put forward as a saving principle, the basis of a new era that was to succeed the era of destructive competition. The producers, under the leadership of Judge Gary as the head of the Steel Corporation, worked for more than three years under a form of co-operation, which resulted in approximate price maintenance, due to friendly personal relations and a new emphasis on the common peril of price cutting. Then came the Stanley committee's investigation and the indiscriminate "trust-busting" campaign of the Taft administration, with its suit for the dissolution of the Steel Corporation. Meanwhile steel manufacturers ceased to hold meetings for the discussion of prices or other market developments and instead gathered twice a year as members of the American Iron and Steel Institute to discuss the technics of iron and steel making, with occasionally a comment on a commercial topic such as contract obligations. Co-operation, as advocated in the trying years just after the panic, dropped out of sight. The freest competition prevailed. Capacity was steadily in excess of demand and in their failure to yield a profit market prices were all that the advocates of "old-fashioned competition" could ask. Co-operation was an avoided word in the steel men's intercourse.

Then came the war and its early financial and shipping problems, with nine months of the severest depression the steel trade had known, followed by suddenly reviving demand and nearly two years of astounding prosperity.

We have called up these aspects of the past ten years in the steel trade to point out that it has apparently taken the most gigantic war in all history to give the idea of co-operation any such place in the general economic program as the country's steel manufacturers sought to give it in their own industry nearly ten years ago. Mr. Topping's address of last Friday night, as referred to elsewhere, cites the recent signs of a growing sentiment favorable to combined effort by manufacturers. The chairman of the Federal Trade Commission has preached it; the President has called for it in all that relates to the prosecution of the war, and every

branch of the Administration has urged it in all the appeals that have been made, even to corporations which the Government has sought to destroy.

The three specific things which Mr. Topping includes in his program for industry are but logical expressions of the new attitude of friendliness for business of which signs have appeared in spite of some indications to the contrary. When a party that got power on the promise of prompt and radical reductions in the tariff proposes horizontal increases, it requires no violent wrench to entertain a proposal to increase the tariff where necessary to protect the home producer and consumer against unfair foreign competition after the war. When to aid our allies Congress is willing to vote three-quarters of a billion to build at war prices a great fleet that afterwards will be sold far below its cost, the passing of laws to offset the handicaps of American merchant shipping, even though such aid bear the name of subsidy, might easily become a popular demand. And when prices of iron and steel have soared to three and four times the average of the past ten years, under free and unrestricted competition, as in these war months, public opinion is not staggered by a proposal that looks toward price maintenance on a far lower level.

Every economic experience of war time is working against those views of trade and industrial policies which in the years last past have controlled the Government's action, to the serious hurt of manufacturers. It is true that war emergencies call for many measures which the country would not and should not tolerate in time of peace. But that fact by no means disposes of the questions suggested by Mr. Topping's thoughtful paper. It may well be asked whether the United States would not have been far better prepared to do its part in the war had the public mind been more friendly to co-operation among manufacturers and had the Government been more willing to use the rule of reason in its treatment of business.

Steel in the Leading Role

The value of a thing is not always fully appreciated until an effort is made to find a substitute for it. That this is true of steel was shown in a highly impressive way last Friday night at the banquet of the American Iron and Steel Institute in a short, business-like speech by Major General

George W. Goethals. The scene was one that will never be forgotten by any of the 800 who witnessed it.

The story which General Goethals told without any attempt at sensationalism was a remarkable one. Here was a soldier, a believer in authority, a man who succeeds where others fail, a man of courage who is not worried about holding his job. A few months ago he was called from his retirement to his country's service. He went to Washington and found a condition that recalled the times not many years ago when one board after another tried to build the Panama Canal and, stirring up dissension rather than blasting rock, failed utterly. It is no wonder that his long entertained aversion to boards was accentuated. Like most political bodies, the Shipping Board was long on promises and impractical as to methods. He saw the folly of robbing the birds of their trees to build a thousand or so boats of green wood. He realized that steel must be used, if possible. He knew the corporation that turns out about half of the country's production of such steel as is used in building ships, principally plates and shapes. In time of the country's dire need, he did not hesitate to go to the president of that corporation which for years the Government had been trying to dissolve on the ground that it was a wicked and dangerous trust. He presented his case, was promptly promised support and last Friday evening appeared before men whose companies combined roll about the same tonnage as the Steel Corporation. He asked them to stand with President Farrell. Unanimously they agreed to do so and there is not a particle of doubt that the promise will be fulfilled.

Some wooden boats probably will be built, for Chairman Denman of the Shipping Board insists that at least a part of the original plan shall be carried out. Dropping into the language of the trust buster of a few years ago, the chairman, in a statement issued this week, declares that "the committees of Congress and not a public dinner with the head of the steel trust are the place for the discussion of matters of policy with regard to shipbuilding," and adds that even with the most successful steel shipbuilding campaign possible, there still would be need for 1000 wooden ships. It is perfectly safe to predict, however, that by far the majority of the new vessels which it is expected will do so much toward winning the war will be large and of steel. There is no substitute.

Our Steel Production

The country's production of steel ingots and castings in 1916, as officially reported in the past week, was 42,773,680 gross tons, or 33 per cent more than the output in 1915, which exceeded by a small percentage the output in 1912 and 1913. Last year was the first since 1906 of full employment of steel-making capacity, but on account of there being a great deal of new construction the production last year is not directly an indication of the capacity. The annual summaries of new construction presented in the annual review numbers of THE IRON AGE have shown 1,405,000 tons annual ingot capacity completed in 1915 and 4,205,000 tons capacity in 1916, with 4,515,000 tons capacity

under construction at the beginning of this year. The capacity at the close of last year may therefore be taken at a trifle less than 45,000,000 tons, while on account of the slowness with which new construction work has been proceeding lately the present capacity is to be taken at not a great deal above 45,000,000 tons.

Both Bessemer and electric steel, which stand sharply opposed in the matter of ease of manufacture, made remarkable showings. Bessemer steel production, which reached its maximum as long ago as in 1906, with 12,275,830 tons, and has since been regarded as a decadent activity, recovered to 11,059,039 tons in 1916. The fact that many converters had meanwhile been abandoned appears to have been offset partly by the separate operation of some converters and open-hearth furnaces that had been built together, as a somewhat larger aggregate output could thereby be secured. The production of steel by the duplex process, however, rose to 3,436,457 tons, the previous record having been 2,210,718 tons, made in 1913.

The production of electric steel, which had shown high points of 52,141 tons in 1910 and 69,412 tons in 1915, increased to 168,918 tons in 1916. Crucible steel production, at 129,692 tons, made its best showing, except for the year 1907. There was a net increase of 63 in the number of electric furnaces in 1916, 73 having been built and 10 abandoned.

The output of rolled steel in 1916 was 30,557,818 tons, or 30.5 per cent more than the output in 1912, 1913 and 1915, these outputs having fallen within a fraction of 1 per cent of each other. In 1915 and 1916 the proportion of rolled steel to steel ingots was 74 per cent, against about 76 per cent in previous years, the decrease being due no doubt to the manufacture of the large tonnage of shell steel, which involves a heavy discard.

The production of rolled iron in 1916 was 1,822,571 tons, the largest output since 1907. The output of rolled iron and steel together was 32,380,389 tons. Comparing 1913 and 1916, the increase in the total output of rolled iron and steel was 30.6 per cent. Structural shapes, however, increased less than 1 per cent, and as 1916 saw an unusual demand for shapes for shipbuilding the consumption in other directions must have decreased. Rail output dropped 19 per cent, although exports increased somewhat.

The increases in the items that involve war steel are quite impressive. Shell steel falls partly in the forging billet category and partly in the merchant bar item. From 1913 to 1916 rolled forging billets increased from 537,210 tons to 2,015,960 tons, or 275 per cent. Merchant bars present the curious case that while the total of rolled iron increased considerably, iron bars decreased, and when one searches for the item responsible for the increase in the total of rolled iron he finds it simply in the "all other" class. Steel bars increased from 2,930,977 tons to 6,619,546 tons, or 126 per cent, and it seems fair to assume that the great bulk of the 3,700,000-ton increase was in rolled rounds for shells. The exports of steel bars rose from 211,716 tons in 1913 to 774,455 tons in 1916.

The production of wire rods increased 43 per

cent to 3,518,746 tons. Exports of rods, plain wire, barb wire and wire nails all increased greatly. In nails the production less exports showed an increase of only 10 per cent. The production of tin plate increased 50 per cent, to 1,235,000 tons, breaking the previous record, made in 1915, by 17 per cent, and all indications are that this year's output will exceed 1,500,000 tons.

CORRESPONDENCE

Integrity of Coke and Pig-Iron Contracts

To the Editor: I have been interested in the reference on page 1268 of your issue of May 24 to a coke contract episode. My interest was awakened because of another peculiar development in connection with a coke contract.

In these times of swiftly advancing prices, the burden of the cost is placed on the seller at low prices and he sees with regret he has obligated himself to deliver goods at a certain price when the market ruling is three or four times this price.

In 35 years of business experience I have never seen a firm or company that sought to evade any obligations incurred until the case mentioned. We had a coke contract for delivery of a stated number of cars over specified dates of 1916. There were no conditions or reservations whatever. It was a bargain of purchase and sale at a stipulated price and stipulated dates of delivery. For reasons unknown to us, but perhaps good, the sellers delayed delivery over the year 1916. In January they wrote, stating that because of increased costs they would be obliged to ask 75c. per ton more for coke than the price at which they had agreed to make delivery. Their attention was called to their agreement, and they recognized their obligation and promised shipment, but have failed up to the present to make deliveries.

This case differs considerably from the one noted by THE IRON AGE. In the published case there would be no justification for the coke company asking an advance over the price agreed upon, but if the buyer chose to make a donation of an additional price, that of course was his privilege. At the present time there are existing iron contracts where the difference between the sold price and the market price is fully \$25. The iron companies do not think for a moment of refusing their contracts or asking any variation. There have been times when foundrymen bought iron at a high price and found when delivery of the iron was made, they were paying \$5 to \$8 more than the market price. We have never heard that the foundrymen tried to evade this obligation, nor have we ever heard that an iron producer tried to evade his obligations.

It is surprising that any business concern mindful of its honor and integrity should try for the sake of a few dollars to evade an obligation it has entered into. It certainly speaks well for the business integrity of the nation that under such trying times the obligations and contracts entered into by business men have been maintained so generally on a high plane of integrity.

FOUNDRYMAN.

Factory Employees and Farm Work

To the Editor: The Government, through each State department, has corresponded with all of the factories, asking how many men they could spare to do farm work. As you know, there are not enough factory hands, and it is hard to let go of the few that we have. There is no reason, however, why nearly all of the factories cannot lease a plot of land on the outskirts of town, within a few minutes' walk of a trolley car. Of their employees, they could appoint a farm committee, and depending upon the number of employees they have, it would give a few half-days' work throughout the summer to each employee. Then, too, if the factory head is in favor of the scheme, it will be conducted in a businesslike manner and there will not be the crop fail-

ure that will be experienced by the many novices who are now planting gardens.

In this company 300 men will raise potatoes, which have been selected because they can be sent direct to the consumer without having to pass through the hands of a middleman. The company has leased five acres of very desirable land for this purpose, and the State Agricultural Experiment Station has offered suggestions for the cultivation of the land. Those who farm will be paid regular farm laborers' wages, exclusive of the factory wage. They will be allowed sufficient time to till the ground and indulge in this healthful outdoor work. The product will be sold direct to the employees' families at cost.

Between now and June 20 is a suitable time for planting potatoes and beans, and I think that if you give this emphasis, hundreds of factories will take it up and thousands of employees, who would not lift a hand toward raising crops otherwise, will be put to work.

KRAEUTER & Co., INC.

563 Eighteenth Avenue, Newark, N. J.

Seeking Women Employees

The Industrial Commission of Wisconsin has announced that a number of large metal working shops in the Milwaukee and nearby districts are employing girls and women to fill places formerly occupied exclusively by men, and offers its co-operation to all employers to procure female help. The commission explains that there are no restrictions in the Wisconsin laws concerning the employment of women, excepting in mines and quarries. It reports that the Nash Motors Company, Kenosha, Wis., already has started to place women in its core-room. The Cutler-Hammer Mfg. Company, electric controlling devices; Geuder-Paeschke & Frey Company, tin and sheet metal goods, not only employ women, but are advertising for additional female shop help. The Allis-Chalmers Mfg. Company is employing women on mica winding and gradually extending female employment. A large machine-shop at Racine has put women to work on punching machines.

Pacific Coast Steel Company Against Saloons

The Pacific Coast Steel Company prints on every pay check an appeal to the men to quit drinking. Sixty-nine per cent of all the accidents at the mill occur on Monday or Monday evening, after the employees have had a Sunday off. On the front of the pay check is printed the usual statement of hours worked or tons handled, the amount of money due each man, and these words: "These pay checks are made non-negotiable so that the employees can not cash them in saloons."

Pay checks go out four times a month, twice each month to one set of men and twice each month to another set of men. Each man receiving a check holds it a few days, and has ample chance to read the truth about liquor published on the back. If he wants to sign an approval of the sentiment he can do so.

Cornwall Ore Bank Company

At the recent annual meeting of the Cornwall Ore Bank Company, held at Cornwall, Pa., the following officers were elected: President, C. A. Buck; treasurer, B. H. Jones; comptroller, F. A. Schick—all of the Bethlehem Steel Company. Harrison Souder, formerly general superintendent, was appointed general manager. J. Taylor Boyd, who has been connected with the company since its organization in 1864, first as general superintendent and later as treasurer, has retired. J. W. McLaughlin is mine superintendent. It is expected that the output of the famous iron mine of this company will be increased to 80,000 tons a month by November.

L. A. Green, dealer in rails, machinery and equipment for mills, mines and contractors, has moved his offices from 1405 First National Bank Building to suite 1610, same building, Pittsburgh.

ADVANCES IN SHEETS AND LABOR

Highest Percentages of Increase Are in Sheet Bars and Blue Annealed

The National Association of Sheet and Tin Plate Manufacturers, Oliver Building, Pittsburgh, Walter W. Lower, secretary and treasurer, has compiled for the membership an interesting statement showing advances in prices on hot mill and common labor in sheet mills, also on sheet bars, on blue annealed, black and galvanized sheets and on spelter, between December, 1915, and May 15, 1917. The figures for December, 1915, are represented in all cases by 100. The statement shows that hot mill labor in the period mentioned advanced 71.70 per cent, common labor 71.41 per cent, sheet bars 203.05 per cent, black sheets 179.50 per cent, blue annealed sheets 209.75 per cent and galvanized sheets 91 per cent, while spelter declined about 45 per cent.

The only advances in spelter between December, 1915, and May 15, 1917, were in the first four months of 1916. In January, 1916, spelter showed an increase in price of 7.70 per cent, in February 19.15 per cent, in March 7.15 per cent and in April 10.30 per cent. The market started to decline in May, showing slight advances during a few months only from that period until May of this year, when the price was only 55.32 per cent of the price ruling in December, 1915. It will be observed that the greatest advances in prices occurred in sheet bars, which this month have been about three times the price of December, 1915. Black sheets are nearly three times as high, and blue annealed sheets more than three times. In computing the present prices ruling on sheets, blue annealed, 10 gage, and black and galvanized, 28 gage, were used as the basis. The prices given as ruling in the different months are averaged from reports of sales made to the National Association of Sheet and Tin Plate Manufacturers by most of the sheet mills. The summary of the data follows:

Relation of Prices for Sheet Mill Labor, Raw Materials and Products Between December, 1915, and May 15, 1917

1915	Labor		Sheet Bars	Black Sheets	Blue Annealed		Galv. Sheets	Spelter
	Hot Mill	Common			100.00	100.00		
Dec. 1915	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1916								
Jan.	103.45	111.41	107.60	102.78	112.82	100.00	107.70	
Feb.	103.45	111.41	112.12	102.78	117.25	101.05	119.15	
Mar.	111.99	114.30	125.75	107.90	126.10	103.80	107.15	
April	111.99	128.58	136.38	114.23	130.50	105.25	110.30	
May	126.60	142.85	130.30	114.62	132.75	105.25	94.24	
June	126.60	142.85	128.80	114.62	132.75	101.05	75.45	
July	127.10	142.85	134.85	114.62	128.32	92.62	56.98	
Aug.	127.10	142.85	140.90	114.62	128.32	88.41	53.35	
Sept.	136.40	142.85	136.38	115.00	128.32	88.41	54.19	
Oct.	136.40	142.85	145.45	127.65	139.40	94.74	58.80	
Nov.	132.20	142.85	163.65	147.05	149.10	112.42	70.28	
Dec.	132.20	157.12	178.10	173.90	171.00	132.00	66.44	
1917								
Jan.	133.70	157.12	197.00	197.65	210.20	142.10	59.06	
Feb.	133.70	157.12	204.55	207.50	210.20	145.25	62.80	
Mar.	153.90	157.12	227.30	222.15	239.80	157.90	64.30	
April	153.90	157.12	257.60	261.70	281.90	181.50	56.09	
May	171.70	171.41	303.05	279.50	309.75	191.00	55.32	

Selling Prices			
December, 1915		May 15, 1917	
Sheet bars	\$33.00	Sheet bars	\$100.00
Black sheets, 100 lb.	2.53	Black sheets, 100 lb.	7.07
Galvanized sheets, 100 lb.	4.75	Galvanized sheets, 100 lb.	9.07
Blue annealed, 100 lb.	2.26	Blue annealed, 100 lb.	7.00
Spelter, 100 lb.	16.72	Spelter, 100 lb.	9.25
Hot mill labor, per ton	9.093	Hot mill labor, per ton	15.618
Common labor, per hour	0.175	Common labor, per hour	0.30

At the present price of black sheets, \$7.07, the hot mill labor will increase to approximately \$25.22 per ton, or 177.35 per cent over December, 1915.

Central Iron & Steel Company Improvements

With the request that the Dauphin County court dismiss the receivers of the Central Iron & Steel Company, Harrisburg, Pa., comes an announcement of an improvement program that will eventually total \$180,000. Robert H. Irons, president of the company, and L. D. Perry, secretary, have reported to the court that the company is now able to assume all obligations, and that all common creditors have been paid. First mort-

gage bonds that at the beginning of the receivership aggregated \$1,239,000 have been reduced to \$637,500, none yet due and payable.

Improvements include the construction of a large type open-hearth furnace, the modernizing of another furnace, the reconstruction of several buildings to meet present demands and the installation of new electrical and mechanical machinery.

Iron and Steel Institute Elections

The following persons were elected last week to the waiting list of the American Iron and Steel Institute and transfers to the membership list will be made as vacancies occur:

- F. E. Patterson, secretary and treasurer American Steel Foundries, Chicago.
- Clarke P. Pond, sales manager David Lupton's Sons Co., Philadelphia.
- John Malcolm Hart, president John M. Hart Company, Chicago.
- Clifford Atwood Cowles, Jr., chief engineer Atlantic Steel Company, Atlanta, Ga.
- Samuel Noble Roberts, assistant general superintendent Atlantic Steel Company, Atlanta, Ga.
- Frank W. Tickner, general manager Valley Mould & Iron Corporation, Sharpsville, Pa.
- Rufus Eicher Zimmerman, assistant director research laboratory American Sheet & Tin Plate Company, Pittsburgh.
- William T. Shepard, partner of Rogers, Brown & Co., Buffalo.
- Parker F. Wilson, assistant to president Otis Steel Company, Cleveland.
- Walter B. Enck, assistant to president Donner Steel Company, Inc., Buffalo.
- Frank D. Hoerle, assistant general manager of sales Donner Steel Company, Inc., Philadelphia.
- William I. Howland, Jr., special agent Carnegie and Illinois Steel Companies, Pittsburgh.
- Frederick Curtis Perkins, executive committee Sharon Steel Hoop Company, Pittsburgh.
- Charles Armstrong Anderson, Jr., district sales manager Pittsburgh Valve, Foundry & Construction Company, Philadelphia.
- Henry Oliver, president Oliver Iron & Steel Company, Pittsburgh.
- W. Vernon Phillips, iron and steel merchant, Lansdowne, Pa.
- Eli Joseph, Joseph Joseph & Bros. Company, New York.
- Joseph Michaels, Hyman Michaels, Chicago.
- Joseph Groves, president New York Metal Exchange, New York.
- E. O'Connor Acker, Bethlehem Steel Corporation, New York.
- John Lyman Cox, engineer, Midvale Steel Company, Philadelphia.

Large Beehive Coke Output in 1916

Beehive coke production in the United States in 1916 was the largest ever recorded. Official figures of the U. S. Geological Survey place the output at 35,464,224 tons, valued at \$95,468,127. This is an increase of 7,955,969 tons, or 29 per cent, over that of 1915, and larger by \$38,522,584 or nearly 68 per cent in value. The average value of the coal used in 1916 was \$1.26 per ton, an increase of 21c. over 1915, and the average value of the coke last year was \$2.69 per ton, an increase of 62c. There were 65,605 active beehive ovens in 1916, as against 48,985 in 1915, an increase of 16,620. The idle ovens were 25,976, as compared with 44,125 in 1915. Abandoned ovens were 2265, of which nearly 1800 were in Pennsylvania. No new ovens were built.

The newly-organized Welland Shipbuilding Company, Ltd., of Welland, Ont., has taken a long-time lease on the plant of M. Beatty & Sons, Ltd., and will build steel freighters, the first of which, it is expected, will be ready for delivery before the close of navigation. The freighters will be of 3000 tons capacity and adapted for either lake or ocean traffic. The concern is capitalized at \$200,000, and is said to have strong financial backing.

The Pennsylvania Railroad is arranging for the construction of 245 locomotives at its Altoona, Pa., shops. The engines will be both of freight and passenger type, and with uncompleted orders now at the shops will keep the plant operating at full capacity, it is said, until the close of 1918. The new locomotives are estimated to cost \$12,600,000.

Iron and Steel Markets

RUSSIAN CARS PLACED

First 10,000 Bought by Washington

Government's Heavy Buying Affects Prices— Automobile Demand Slackening

The enormous volume of the Government's purchases of steel, those now under final negotiation and those expected in the near future, tends to put prices higher for the manufacturing consumer. Sheets are a conspicuous example, the Government's requirements turning out to be much greater than early estimates. The week's advance here has been about \$5 per ton, but Government orders are taken at 15 to 20 per cent below the recent market.

There is great interest in the placing by the Government of 7,500,000 shells for field artillery on which awards are looked for daily. About 50,000 tons of steel will be required.

The spectacular pledge made by steel manufacturers at their meeting in New York last week to give the Government ship steel as fast as called for can be made good only by plate and structural mills. Present ship plate capacity is about 150,000 tons a month and 75,000 tons a month more will be ready early in 1918, some of it earlier. To build 3,000,000 tons of steel ships in 18 months would call for about 1,000,000 tons of plates and 300,000 tons of shapes. Fabricating mills, under the new construction plans, will help in speeding up shipyard operations, but there is no prospect of a monopolizing of plate mill capacity by shipbuilding.

Of the long awaited Russian car orders it is significant that two have been given out through Washington for 5000 cars each to the Standard and American Car & Foundry Company shops. The rolled steel requirements are 45,000 to 50,000 tons. An item in exports for locomotive work is 4000 tons of tires.

Much has been made of shipyard possibilities in connection with the Steel Corporation's purchase of a 60-acre site near Newark, N. J., but there is no official statement except that the land has been purchased.

The expected falling off in consumption of steel for automobiles has come. Makers of pleasure cars are curtailing operations and in some cases have asked for the holding up of shipments. So far as the mills are concerned such requests are welcome, especially by makers of sheets and bars. At the same time Government buying of motor trucks, more than 70,000 being under inquiry, will make a heavy demand for steel. One inquiry has appeared for 20,000 tons of base bands for rims.

Wire manufacturers have had a two days' conference this week on the distribution of the wire required for the Government and Allied contracts for wire rope. The latter are now expected to be much

in excess of 25,000 tons. Heavy buying of wire nails for the Allies is yet to be put through. All the 40,000 tons of barb wire and 5000 tons of plain wire recently bought for Italy was taken by the leading producer.

The situation in respect to deliveries of nearly every form of finished material is tightening, as the hand of the Government reaches into transportation to secure preferential provision for the movement of iron ore and coal.

The feature of the basic pig iron market has been the sale of 35,000 tons in eastern Pennsylvania. The steel company which bought 15,000 tons last week for delivery this year has now taken 5000 tons additional for such delivery and 25,000 tons for the first half of 1918, all at \$42, delivered at Coatesville. A sale of 5000 tons of eastern Pennsylvania basic for this year has been made at \$42 at furnace, or \$43 at buyer's works. A West Virginia steel company is in the market for 9000 tons. Pittsburgh reports that negotiations have started for large lots of Bessemer and basic iron and that sellers are holding for about \$2 advance.

Low phosphorus iron in the East presents the unparalleled situation of the practical selling up of product for a full year ahead.

Foundry iron is higher by \$1 in nearly all markets, and in the Valleys of the Central West \$43 is firmly established. One large Alabama producer has advanced its price for 1917 iron to \$42 at furnace.

Lake Superior iron ore shippers have asked furnacemen to take only sufficient quantities to run their furnaces until June 1, 1918, the effort being to limit shipments down the Lakes to actual necessities. Otherwise, the Lake fleet, with the late opening and a present shortage of 5,000,000 to 6,000,000 tons, compared with last year, will be unable to cope with the later season demand.

Pittsburgh

PITTSBURGH, PA., May 28, 1917.

As yet, very little is known definitely as to what the Government needs in steel are going to be, but everything that has developed so far indicates that the amount of steel to be bought by the Government in various forms will be much larger than at first supposed. This is especially true of tin plate and sheets, contracts for the latter already placed having been much larger than expected. It is now also believed that the Government needs for plates, if the ship-building project of the American Bridge Company goes through—and it is believed that it will—are going to be much heavier than expected. It is almost impossible for domestic buyers to place orders for plates with any of the mills, as the mills are afraid to sell, fearing the Government may come on them with heavy demands for plates and take practically all they can make over the next six months, or longer. Consumers are combing the market, trying to find plates, and would pay any price to get them.

Advances in prices are still taking place, and it is probable that before this week ends Bessemer and basic

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	May 29, 1917.	May 23, 1917.	April 25, 1917.	May 31, 1916.
No. 2 X, Philadelphia...	\$45.50	\$44.00	\$42.50	\$20.50
No. 2, Valley furnace....	43.00	43.00	40.00	18.00
No. 2 Southern, Cin'ti....	42.90	42.90	37.90	17.90
No. 2, Birmingham, Ala.	40.00	40.00	35.00	15.00
No. 2, furnace, Chicago*	46.00	45.00	41.00	19.00
Basic, del'd, eastern Pa..	42.50	42.00	38.00	20.50
Basic, Valley furnace....	42.00	42.00	40.00	18.00
Bessemer, Pittsburgh....	45.95	45.95	42.95	21.95
Malleable Bess., Ch'go*	46.00	45.00	41.00	19.50
Gray forge, Pittsburgh..	40.95	40.95	38.95	18.70
L. S. charcoal, Chicago..	50.25	50.25	41.75	19.75

Rails, Billets, etc., Per Gross Ton:	May 29, 1917.	May 23, 1917.	April 25, 1917.	May 31, 1916.
Bess. rails, heavy, at mill	38.00	38.00	38.00	33.00
O.-h. rails, heavy, at mill	40.00	40.00	40.00	35.00
Bess. billets, Pittsburgh..	95.00	90.00	75.00	45.00
O.-h. billets, Pittsburgh..	95.00	90.00	75.00	42.00
O.-h. sheet bars, P'gh....	95.00	90.00	77.50	42.00
Forging billets, base, P'gh	110.00	110.00	100.00	69.00
O.-h. billets, Phila.....	95.00	90.00	75.00	50.00
Wire rods, Pittsburgh....	90.00	85.00	85.00	60.00

Finished Iron and Steel:

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia...	4.159	4.159	4.159	2.659
Iron bars, Pittsburgh....	4.00	4.00	3.75	2.60
Iron bars, Chicago.....	3.50	3.50	3.25	2.35
Steel bars, Pittsburgh....	4.00	4.00	3.75	3.00
Steel bars, New York....	4.169	4.169	3.919	3.169
Tank plates, Pittsburgh..	7.00	6.50	6.00	3.75
Tank plates, New York...	7.100	6.919	6.169	3.919
Beams, etc., Pittsburgh..	4.00	4.00	4.00	2.60
Beams, etc., New York...	4.419	4.419	4.169	2.769
Skelp, grooved steel, P'gh	3.50	3.50	3.50	2.35
Skelp, sheared steel, P'gh	5.50	5.50	5.50	2.45
Steel hoops, Pittsburgh..	4.25	4.25	4.25	2.75

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire:	May 29, 1917.	May 23, 1917.	April 25, 1917.	May 31, 1916.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	7.50	7.50	6.25	2.90
Sheets, galv., No. 28, P'gh	9.00	8.50	8.00	4.75
Wire nails, Pittsburgh...	3.50	3.50	3.50	2.50
Cut nails, Pittsburgh....	4.00	3.75	3.75	2.60
Fence wire, base, P'gh...	3.45	3.45	3.45	2.45
Barb wire, galv., P'gh...	4.35	4.35	4.35	3.35

Old Material, Per Gross Ton:

Iron rails, Chicago.....	\$38.50	\$34.50	\$33.00	\$17.50
Iron rails, Philadelphia..	35.00	35.00	33.00	20.00
Carwheels, Chicago.....	33.00	30.00	24.00	12.75
Carwheels, Philadelphia..	30.00	29.00	27.00	16.50
Heavy steel scrap, P'gh...	30.00	29.00	28.00	16.50
Heavy steel scrap, Phila.	26.00	26.00	25.00	16.00
Heavy steel scrap, Ch'go	32.00	29.00	27.50	15.50
No. 1 cast, Pittsburgh...	26.00	26.00	24.00	16.00
No. 1 cast, Philadelphia..	30.00	30.00	28.00	17.50
No. 1 cast, Ch'go (net ton)	26.00	25.00	21.50	12.00
No. 1 RR. wrot, Phila....	42.00	42.00	39.00	22.00
No. 1 RR. wrot, Ch'go (net)	30.00	34.00	32.00	16.00

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$8.50	\$8.50	\$7.00	\$2.50
Furnace coke, future....	8.00	8.00	8.00	2.50
Foundry coke, prompt...	9.50	9.00	8.50	3.25
Foundry coke, future....	9.00	9.00	9.00	3.25

Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	32.50	31.50	30.00	28.25
Electrolytic copper, N. Y.	32.50	31.50	30.00	28.00
Spelter, St. Louis.....	9.37 1/2	9.25	9.00	13.75
Spelter, New York.....	9.62 1/2	9.50	9.25	14.00
Lead, St. Louis.....	11.22 1/2	10.72 1/2	9.20	7.20
Lead, New York.....	11.37 1/2	10.87 1/2	9.40	7.35
Tin, New York.....	65.00	65.50	57.50	46.75
Antimony (Asiatic), N. Y.	24.00	25.50	34.00	25.00
Tin plate, 100-lb. box, P'gh	\$8.50	\$8.50	\$8.00	\$5.50

pig iron may be up several dollars per ton. Soft Bessemer and open-hearth billets and sheet bars are now at \$95 minimum at mill, and forging billets are \$115 minimum at mill, and have sold higher. The heavy Government demand for sheets has put up prices on all grades \$5 to \$10 per ton. Tin plate cannot be had at any price. Cold rolled strip steel is higher for prompt delivery. Coke is very firm, and producers are refusing to name prices for last half of the year delivery. Several grades of old material are up \$1 to \$3 per ton.

Pig Iron.—Some negotiations are under way for large quantities of Bessemer and basic pig iron, and it is expected that within a few days some large sales will have been closed at prices \$2 per ton or more higher than ruled last week. The new demand for foundry iron is active, No. 2 being very firm at \$43 at furnace, and some sellers holding for \$45. The large Eastern steel company referred to last week as having bought 15,000 tons of basic iron from Eastern furnaces at \$42 delivered has again come in the market and bought about 30,000 tons more. Of the total of 45,000 tons of basic bought by this concern, 25,000 tons is for delivery this year, and probably 20,000 tons for next year. The same company is still in the market for about 10,000 tons of basic for late delivery. Another Eastern consumer has bought 5000 tons of basic at \$42 at furnace, the iron costing \$43 delivered. Local sellers will not sell basic at \$42 or Bessemer at \$45, and say they will get higher prices before this week is out. Prices in effect at this writing (Monday, May 28) are as follows: Standard Bessemer iron, \$45 to \$46; basic, \$42; No. 2 foundry, \$43, for delivery over last half and first half of 1918; gray forge, \$41, and malleable Bessemer, \$43, all f.o.b. cars at Valley furnace. The freight rate for delivery in the Cleveland and Pittsburgh district is 95c. per ton.

Billets and Sheet Bars.—It is now authentically stated that soft Bessemer and open-hearth sheet bars have sold for fairly prompt delivery \$100 per ton at maker's mill, and even \$105 at mill has been hinted at.

It is practically impossible to find soft Bessemer or open-hearth steel at any price. Mills are sold up tight and are very much back in shipments. Some sales of discard steel are still being made, and we note one sale of 300 tons at \$40 per gross ton, maker's mill. Considerable quantities of steel ingots are also changing hands at about \$65 to \$67, maker's mill. These ingots are shipped to other steel mills that have blooming-mill capacity, and rerolled into billets or sheet bars. We now quote soft Bessemer and open-hearth billets and sheet bars at \$95 to \$100 per ton, maker's mill, Pittsburgh or Youngstown. We quote forging billets at \$110 to \$115 for ordinary sizes and carbons, per gross ton at maker's mill. We note sales of 150 tons or more at about \$115, maker's mill, for delivery in three to four months.

Ferroalloys.—There is still very strong talk that the ferromanganese situation would be taken in hand by the Government, with a view of solving the problem of getting a larger supply for the increased output of steel. There has been a fairly large increase in domestic output of ferromanganese in the past six months or more, but the supply is still inadequate to meet the demand promptly. Prices quoted on 50 per cent ferrosilicon range from \$150 to \$200 per ton for fairly prompt shipment.

We quote 80 per cent domestic ferromanganese at \$400 to \$425 per gross ton, delivered. The famine in supply of 99 per cent ferrosilicon still exists, and small lots are being sold at \$200 to \$250 delivered. Spiegeleisen continues to sell at about \$4 per point, and we quote 18 to 22 per cent at \$75 to \$80 and 25 to 30 per cent at \$100 to \$110, delivered. We quote 9 per cent Bessemer ferrosilicon at \$64, 10 per cent \$65, 11 per cent \$67, 12 per cent \$70, 13 per cent \$75, 14 per cent \$80, 15 per cent \$85, and 16 per cent \$90. We quote 7 per cent silvery iron at \$46 to \$47; 8 per cent, \$47 to \$48; 9 per cent, \$49 to \$50; 10 per cent, \$50 to \$51, 11 and 12 per cent, \$52 to \$53, all f.o.b. at furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., these furnaces having uniform freight rates of \$2 per ton for delivery in the Pittsburgh district.

Structural Material.—The new inquiry is fairly heavy, and some fairly large Government jobs have been placed. The McClintic Marshall Company has taken

4500 tons of steel for new buildings to contain two new plate mills to be built for the Brier Hill Steel Company at Youngstown, Ohio; also 5000 tons of steel for machine shop and foundry buildings for the Government Navy Yard at Norfolk, Va., and 4000 tons for a crane runway at the New York Navy Yard. The McClintic Marshall Company is low bidder on 2300 tons of steel for inspection sheds for the Public Service Commission in New York, and will likely be awarded the contract. The King Bridge Company, Cleveland, has been awarded 3050 tons for the Cleveland city auditorium at a lump sum of \$542,900 or \$145.21 per ton, erected.

We quote beams and channels up to 15 in. at 4c. at mill for fairly prompt delivery, while small lots from warehouse bring up to 5c. and higher, depending upon quantity.

Plates.—No important contracts for steel cars were placed in the past week, and the steel car builders are really indifferent about taking on new contracts for cars, as they cannot get plates and shapes from the mills to build cars already on their books and on which they are very much behind on deliveries. The Council of National Defense has taken up the matter of domestic steel car builders furnishing freight cars for Russia and France, and as a result it is expected that orders will shortly be placed in this country for at least 20,000 freight cars of several different types, more than half of this number to go to Russia. If these orders for cars for Russia and France are placed under Government supervision they will have preference in deliveries over any other orders for cars now on the books of the builders. Last week a buyer for a New York house was in Pittsburgh trying to buy 3000 tons of ship plates for delivery in the last quarter of this year. All the mills in this district were visited and the buyer was able to get only 200 tons for delivery late in the year. The Government needs of steel plates are going to be very heavy and domestic consumers will find later on that deliveries are worse instead of better. Plate mills continue to quote 7c. to 8c. at mill for ordinary $\frac{1}{4}$ -in. and heavier tank plates for delivery in four to six months, but some lots have sold at 10c. at mill or higher. Ship plates are now quoted at 9c. to 10c. at mill, and sheared plates from warehouse bring 10c. to 11c. and higher.

Steel Rails.—The Carnegie Steel Company has taken 3000 tons of standard sections open hearth rails for the Clover Leaf Railroad for late 1918. A very large quantity of light rails is under negotiation for track work for French lines. The new demand for light rails is active and one mill is quoting \$5 per ton higher than what is regarded as regular prices. We quote angle bars at 3.25c. to 3.50c. at mill when sold in connection with orders for standard section rails, but on small lots as high as 4c. at mill is being quoted.

Angle bars at 2.75c. at mill, when sold in connection with orders for standard section rails, and on carload and smaller lots, 3c. to 3.25c. at mill. We quote light rails as follows: 25 to 45 lb., \$60; 16 to 20 lb., \$61; 12 and 14 lb., \$62; 8 and 10 lb., \$63; in carload lots, f.o.b. mill, with usual extras for less than carloads. Standard section rails of Bessemer stock are held at \$38, and open-hearth \$40, per gross ton, Pittsburgh.

Tin Plate.—Manufacturers of tin plate believe they will be able to take care of Government contracts for tinplate fairly promptly, and also believe they can meet in good shape the demands of can companies that are making tin can containers for perishable foods. Practically ever since war was declared the tin plate manufacturers have been concentrating their efforts on getting out a maximum output of bright plate, and the output has been correspondingly heavy. Concerns that are making tin cans to contain non-perishable foods will suffer for lack of plate, and many of them will no doubt be compelled to arrange for other materials for making containers, such as paper and other products. The tinplate makers are acting closely with the Government and have given assurances in every way they can that Government orders for tinplate will come first, and will be shipped out to the can makers as fast as possible. This will also hold in cases where tinplate is being furnished to the large meat packers, who are packing meats for the army, and is known as indirect Govern-

ment business. It is now claimed that there will have to be a material increase in output of Bessemer and open-hearth sheet bars before the tinplate mills can make any increased output of tinplate, or else steel that is being used for other purposes will have to be diverted to the tinplate mills. The new demand for tinplate is still very heavy, but mills are paying very little attention to new business being offered, now concentrating their entire efforts on getting out tinplate, on Government and domestic orders already on their books, which will take their entire output and more over the remainder of this year. No attention whatever is being paid to export inquiries, which are still very heavy, and on which fabulous prices are being offered to the tinplate mills. We quote on small current orders from stock, \$9 to \$9.50 per base box on primes, and 25c. less for wasters.

We quote long terme plate, No. 28 gage base, at \$7.25 to \$7.50; short terme plate, \$12 to \$12.50, maker's mill, prices depending on quantity and delivery wanted. The present schedule of prices on terme plate is as follows: 8-lb., 200 sheets, \$14 per package; 8-lb., 214 sheets, \$14.30 per package; 12-lb., I. C., \$15.25 per package; 15-lb., I. C., \$15.75 per package; 20-lb., I. C., \$16.50; 25-lb., I. C., \$17.25; 30-lb., I. C., \$18; 35-lb., I. C., \$18.75; 40-lb., I. C., \$19.50.

Iron and Steel Bars.—Mills continue to report the new demand for iron and steel bars as very heavy, and say they are not catching up on deliveries, on which they are very much behind. On steel bars local makers are almost sold up for the remainder of this year, and on iron bars local mills have nothing to offer for delivery before last quarter. Prices are ruling very firm, and heavy premiums are being paid for fairly prompt deliveries of either iron or steel bars. We now quote steel bars at 4c. to 4.25c. for delivery late this year, and 4.50c. to 5c. from warehouse, in small lots, for prompt shipment. We quote refined iron bars at 4c. and railroad test bars at 4.10c. in carloads and larger lots, at mill.

Cold Rolled Strip Steel.—Manufacturers of cold rolled strip steel are so far back in deliveries that they are reluctant to take on any more new orders, and as yet none of the mills is quoting for delivery beyond June 30. However, very little of the cold rolled strip steel that was sold some time ago for delivery in second quarter will be delivered before third quarter. No orders have been placed by the Government for strip steel for war purposes, but this material is used in the manufacture of hundreds of small articles that are used by the Government and also by domestic customers. Strip steel is well adapted for cartridge clips, and it is likely a good deal will be needed later for that purpose.

We quote on current orders 8.00c. to 8.50c. at mill, for delivery to July 1. Terms are 30 days net, less 2 per cent for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Sheets.—The American Iron and Steel Institute general committee on iron and steel products has appointed a subcommittee on sheet steel, consisting of W. S. Horner, chairman, who is also president of the National Association of Sheet and Tin Plate Manufacturers, Walter C. Carroll, one of the assistant general managers of sales of the American Sheet & Tin Plate Company and Charles O. Hadley, of the Alan Wood Iron & Steel Co., Conshohocken, Pa. The main duty of this committee will be to distribute among the mills Government orders for the different grades of sheets, and to accelerate deliveries as far as possible. Nearly all sheet makers are receiving inquiries for sheets reported to be for Government needs, some of these inquiries coming from concerns with which they have never done business before, and in such cases the mills are referring these inquiries back to their sources, requesting that they be furnished the Government proposal number, the department from which the inquiry comes, and names of articles for which the sheets are to be used. The committee named above is also asking the sheet mills to quote as far as possible on Government direct inquiries and also on indirect business. The latter inquiries are coming from manufacturers who are making goods for the Government in which sheets are used. The committee does not pre-

tend to control in any way prices being quoted by the sheet mills on direct Government orders, Government work or on indirect business intended for Government work. As a rule, mills are quoting 15 to 20 per cent less on direct Government orders and indirect Government business, than the minimum prices they are quoting to the domestic trade. In other words, quotations so far have been about on the basis of 6.25c. for Nos. 9 and 10 blue annealed sheets, 6.50c. on No. 28 Bessemer black and 8c. to 8.50c. on No. 28 galvanized. Prices quoted to the regular trade on Nos. 9 and 10 blue annealed sheets now range from 7c. and upwards, No. 28 black, 7c. to 7.50c. and on No. 28 galvanized 9c. to 9.50c. at mill. The Government orders for sheets so far have been heavy, and its requirements will likely be much larger than anticipated. However, the sheet mills believe they will be able to fill Government orders fairly promptly, as they will, of course, have preference over all other contracts on their books, and at the same time, the sheet mills believe they will be able to take care of domestic trade in fairly good shape, but there will be serious delays in deliveries on domestic business. The domestic demand for sheets is heavy from all sources, and mills are falling further behind in shipments. Prices on blue annealed and galvanized sheets are again higher by about \$5 per ton to the domestic trade. We now quote No. 3 to 8 gauge, blue annealed sheets, 6.75c. to 7c.; No. 28 box annealed one pass Bessemer, cold rolled, 7c. to 7.50c.; No. 28 galvanized 9c. to 9.50c. and No. 28 black plate, tin mills sizes 7c. to 7.50c., all f.o.b. mill, Pittsburgh. These prices are for carload and larger lots, for delivery over the next 4 to 6 months. For fairly prompt delivery, premiums of from \$5 to \$10 or more have been paid.

Muck Bar.—As high as \$75 per gross ton has been offered the local maker for muck bar made from all pig iron. The last sale here was made at \$65 nearly a month ago. The local producer is sold up for several months ahead, and has refused \$75 per ton at mill.

Wire Products.—The options given some time ago by local wire-nail makers on part of the inquiry for 240,000 kegs of wire nails for the Allies were allowed to expire, but on Monday, May 28, the inquiry came out again, and several local makers have again bid on part of the contract, naming somewhat higher prices than when they first quoted. It is believed that at least part of this large order will be placed for delivery late in the year, and most of it is expected to be taken by the American Steel and Wire Company, while part of it will likely be divided between independent mills. The United States Steel Products Company has taken a contract from Italy for 40,000 tons of barb wire and 5000 tons of plain wire, equal deliveries over last six months of this year. All this wire will be furnished by the American Steel & Wire Company. An inquiry has just come out from Canada for 5000 tons of barb wire, and from the fact that the specifications called for the wire to be wrapped in 28-lb. spools it is supposed to be for delivery to Italy, and will have to be taken over the mountains. It is likely local makers of barb wire will not bid on this inquiry, as they object to the lightweight spools. The domestic demand for both nails and wire is still very heavy, and all the mills are back in delivery eight to ten weeks or longer, and are sold up for four or five months ahead. The American Steel & Wire Company is still quoting prices on wire nails and wire \$6 per ton lower than prices being quoted by the independent mills, the prices being quoted by the independent mills to regular customers, in carloads and larger lots, are as follows:

Wire nails, \$3.50 base per keg; galvanized, 1 in. and longer, including large-head barb roofing nails, taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire is \$3.55 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.45; galvanized wire, \$4.15; galvanized barb wire and fence staples, \$4.35; painted barb wire, \$3.65; polished fence staples, \$3.65; cement-coated nails, \$3.40 base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 48 per cent off list for carload lots, 47 per cent off for 1000-rod lots, and 46 per cent off for small lots, f.o.b. Pittsburgh.

Wire Rods.—Makers continue to report a very heavy domestic demand for wire rods, and the export inquiry

is also active. It is not believed that any soft Bessemer or open-hearth rods could now be bought at less than \$90 at maker's mill, and some mills are asking higher prices. Prices on high carbon rods are likely to be higher on account of the prices being asked for ferromanganese, the manganese content now cutting an important figure in prices on high carbon rods.

We quote soft Bessemer and open-hearth rods to domestic consumers at \$90 to \$95; high-carbon rods made from ordinary open-hearth steel, \$90 to \$100, and special steel rods, with carbons running from 0.75 to 0.90, \$105 to \$115 at mill.

Hoops and Bands.—The new demand for both hoops and bands is very heavy, and prices are steadily going up. One large maker has been out of the market for delivery this year for some time. Other mills that can ship hoops and bands in six to eight months are quoting on the basis of 4.50c. to 5c. on hoops and 4c. to 4.50c. on steel bands, extras as per the steel bar card. For fairly prompt delivery, both hoops and bands are held at higher prices.

Shafting.—The new demand is heavier now than for a long time. Local makers who recently could ship out large rounds and squares in 60 to 90 days are now quoting for delivery in five to six months. Specifications from the automobile trade are not so active, but from the screw stock and implement trades are very heavy. One leading maker is practically out of the market for delivery over the remainder of this year. Discounts on cold rolled shafting range from 15 to 5 per cent off list, depending on the quantity and the delivery wanted, but the larger discount, it is said, will soon disappear and is now given only to a few of the very largest users and for forward delivery.

Railroad Spikes and Track Bolts.—The new demand for spikes is reported more active than for some time. No large contracts are being placed, railroads being well covered over the remainder of this year, but there is a heavy demand from jobbers, and also fairly large orders from railroads which find they need more spikes to round out their new track laying programs for this year. The demand for boat spikes is enormously heavy, coming from all sections of the country to local makers, who are practically sold up on boat spikes for remainder of this year. The prices on small spikes and boat spikes are higher.

We now quote railroad spikes 9/16 in. and larger at \$3.85 to \$4 base, 3/4 in., 7/16 in. and 1/2 in., \$4.50 to \$5.00 base, 5/16 in., \$5 to \$5.50 base. Boat spikes are about \$5 base, all per 100 lb. f.o.b. Pittsburgh, but some makers are quoting above that price. We quote track bolts with square nuts at 6c. to 6.50c. to railroads, and 7c. to 7.50c. in small lots, for fairly prompt shipment.

Rivets.—The new demand is heavy, and consumers are placing orders freely for delivery in last half of this year. There is also an active export demand mostly from South America, Europe and India. Makers report deliveries of steel by the mills very slow, and this is cutting down output of rivets to some extent.

Structural rivets, \$4.75 per 100 lb. base; boiler, \$4.85 per 100 lb. base.

From July 1, 1917, to Oct. 1, 1917, structural rivets, \$4.90 per 100 lb. base; boiler, \$5 per 100 lb. base. F.o.b. Pittsburgh, Pa.

Terms: 30 days net or 1/2 of 1 per cent for cash in 10 days.

Wrought Pipe.—None of the pipe mills is quoted on lap weld iron and steel pipe for delivery before October next, and some mills will not quote for any delivery this year, being sold up on all the pipe they can turn out up to next January, or later. Gas and oil companies that have been trying to place contracts for line pipe have become discouraged and have pulled out of the market saying they cannot get any of the mills to take their business. On butt weld iron and steel pipe mills are quoting for delivery in 10 to 12 weeks. As yet the National Tube Company has not made any change in its discounts as adopted on April 2. Discounts on iron and steel pipe in effect by the independent mills from May 1 are given on another page.

Nuts and Bolts.—The new demand is reported active, and makers of nuts and bolts are now covering their trade for third quarter, while from some of the largest consumers they are accepting orders for delivery over the last half of the year. The export demand is active, and comes mostly from South America, Europe and Japan. Local makers are not quoting on

export inquiries, as they say they cannot get out enough nuts and bolts to satisfy domestic customers. Discounts adopted April 12 are still in effect as follows:

Discounts in effect are as follows, delivered in lots of 300 lb. or more, when the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 40 per cent; small, cut thread, 35 and 2½ per cent; large, 25 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 40 and 10 per cent; small, cut thread, 40 per cent; large, 30 per cent.

Machine bolts, c. p. c. and t. nuts, small, 30 per cent; large, 20 per cent. Bolt ends, h. p. nuts, 30 per cent; with c. p. nuts, 20 per cent. Lag screws (cone or gimlet point), 45 per cent.

Nuts, h. p. sq., blank, \$2.10 off list, and tapped, \$1.90 off; hex., blank, \$1.90 off, and tapped, \$1.70 off; nuts, c. p. c. and t. sq., blank, \$1.70 off, and tapped, \$1.50 off; hex. blank, \$1.60 off, and tapped, \$1.40 off. Semi-finished hex. nuts, 50 and 10 per cent. Finished and case-hardened nuts, 50 and 10 per cent.

Rivets 7/16 in. in diameter and smaller, 40 per cent.

Boiler Tubes.—There is no change in the situation. Mills making iron and steel tubes are sold up for all of this year, and some have their product sold up to July, 1918. Nominal discounts which do not represent actual market prices are given on another page.

Old Materials.—Most of the activity last week in the local scrap market was in low phosphorus melting stock, and in borings and turnings. It is said the Carnegie Steel Company recently paid to the railroads \$31 to \$32 at loading point for selected heavy steel scrap, but this price is somewhat higher than the regular market. Dealers are quoting heavy steel scrap at \$30 to \$31, some refusing to sell at less than the higher price. Low phosphorus melting stock is very active and is bringing high prices, having sold at \$45, delivered, for billet and bloom ends. The local scrap market as a whole is very firm, and dealers are looking for higher prices in the near future. We note sales of about 2000 tons of low phosphorus melting stock at \$44 to \$45, delivered. We also note sales of 2000 tons or more of cast iron borings at \$15.75 to \$16, delivered, and also about 2000 tons of turnings at \$15 to \$15.50, delivered. Prices for delivery in Pittsburgh and other consuming points that take Pittsburgh freight rates, per gross ton, are nominally as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	\$30.00 to \$31.00
No. 1 foundry cast	25.50 to 26.00
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	34.00 to 35.00
Hydraulic compressed sheet scrap	22.00 to 23.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	19.00 to 20.00
Bundled sheet stamping scrap	18.00 to 18.50
No. 1 railroad malleable stock	32.00 to 33.00
Railroad grate bars	16.00 to 17.00
Low phosphorus melting stock	43.00 to 45.00
Iron car axles	47.00 to 48.00
Steel car axles	50.00 to 52.00
Locomotive axles, steel	53.00 to 55.00
No. 1 busheling scrap	22.00 to 23.00
Machine-shop turnings	15.00 to 15.50
Old carwheels	26.00 to 27.00
Cast-iron borings	15.75 to 16.00
*Sheet bar crop ends	36.00 to 37.00
No. 1 railroad wrought scrap	34.00 to 35.00
Heavy steel axle turnings	19.00 to 20.00
Heavy breakable cast scrap	24.00 to 25.00

*Shipping point.

Coke.—Absolutely nothing is being done between producers of blast furnace coke and consumers in the matter of making contracts for delivery over the last half of this year. Some time ago several leading producers figured that they should get at least \$8 per net ton, at oven, for their coke for last half of this year, but now they say they would not sell at this price, and will probably want \$8.50 or \$9 at oven. Furnaces do not seem to be in a hurry to contract, and it may be some little time before contracts for last half of the year furnace coke are closed. The car supply all last week was bad, and on Monday, May 28, it was only 25 per cent. Prices on prompt coke are firm. We quote best grades of blast furnace coke for prompt shipment at \$8.50 to \$9 per net ton at oven. We omit quotation on furnace coke for last half of this year, as nothing is being done. We quote best grade of 72-hr. foundry coke for prompt delivery at \$9.50 to \$10, and on contracts for

second half of this year, \$9 to \$9.50 per net ton at oven. The *Connellsville Courier* gives the output of coke in the upper and lower Connellsville regions for the week ending May 19 as 360,940 tons, a decrease over the previous week of 19,590 tons.

Chicago

CHICAGO, ILL., May 28.

The outstanding features of this market are presented by pig iron and old material. The former is up \$1 for delivery this year or next. The scrap market has advanced by leaps and bounds and new levels hold but a short time. The Steel Corporation is reported to have bought nearly 100,000 tons in the past few days and has not hesitated in paying high prices. No. 28 galvanized sheets are quoted at 10.50c. by some makers. The demand for plates is stronger than ever and makers are declining to accept 8c., but little or no change is presented in plates, shapes and bars, the mills continuing to await action by the Government.

Pig Iron.—Inquiry continues active. Despite higher prices in the past week, a big business has been done, especially in Southern iron for 1918 delivery. The makers of Northern Bessemer, basic and No. 2 foundry have advanced their prices \$1 per ton and now quote \$46 furnace for those grades for last half and \$44 for first half. Southern iron is quoted at \$38, Birmingham, for first half and \$42 for the last quarter of this year, no nearby iron being had by the producer making these prices. A big tonnage was booked in the past week at \$36, Birmingham, and some at \$38. Of 20,000 tons placed by one maker, only 200 is for delivery this year. Several of his sales were for 2000-ton lots. Other makers ask a minimum of \$40 Birmingham for this year or next and for early shipments sales have been made at prices equivalent to \$41 Birmingham. Southern quotations are irregular. The agricultural stove car and machinery interests have been active. Tennessee 8 per cent silvery is higher at \$52.75 Chicago. Charcoal iron is unchanged around \$50 furnace. A maker states that he is not disposed to encourage advances. Most prices are subject to furnace confirmation.

The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer, and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton.

Lake Superior charcoal, Nos. 1 to 5	\$50.25
Lake Superior charcoal, No. 6 and Scotch	51.75
Northern coke foundry, No. 1	46.50
Northern coke foundry, No. 2	46.00
Northern coke foundry, No. 3	44.50
Northern high-phosphorus foundry	46.00
Southern coke No. 1 f'dry and 1 soft	45.50
Southern coke No. 2 f'dry and 2 soft	44.00
Malleable Bessemer	45.00
Basic	46.00
Low-phosphorus	80.00
Silvery, 8 per cent	52.75
Bessemer ferrosilicon, 10 per cent	70.50

Ferroalloys.—Quotations for 80 per cent ferromanganese are unchanged at \$425 to \$450 for prompt delivery and \$400 for late 1917 delivery.

Structural Material.—An Eastern mill quotes 4.75c. Pittsburgh on what it can roll and 5c. on material in stock. For delivery in six to eight months, 4.25c. Pittsburgh is the nominal quotation, but most of the mills assert themselves to be filled. When the Government apprises them of where they stand, they may be in a position to take on further business. Awards include the Garfield flume bridge between New Mexico and Texas for the United States reclamation service, 150 tons, to an unknown company; car frames for the Chicago Steel Car Company, 306 tons, to an unknown company; 4000 truck frames for the Commercial Truckmobile Company, Chicago, 580 tons, to the American Bridge Company; street viaducts at Chicago for the Chicago Union Station Company, 1659 tons, to the American Bridge Company. Jobbers' prices are unchanged at 5c.

Plates.—Demand from varied directions is increasing, and while 7.50c. to 8c., Pittsburgh, may still be called the market, makers have declined to accept 8c. for tank plates. All the mills show a disposition to refrain from quoting until the needs of the Govern-

ment are received in a direct manner. Jobbers' quotation is unchanged.

We quote for Chicago delivery of plates out of jobbers' stocks, 6.50c. to 7c.

Rails and Track Supplies—Except for some odd lots of spikes and bolts, no activity is reported. For bolts 5c. has been paid. All prices are unchanged.

Quotations are as follows: Standard railroad spikes, 4c. to 4.10c., base; small spikes, 4.25c. to 4.35c., base; track bolts with square nuts, 5c. to 5.10c., all in carloads, Chicago; tie plates, \$60 to \$70 f.o.b. mill, net ton; standard section Bessemer rails, Chicago, \$38, base; open hearth, \$40; light rails, 25 to 45 lb., \$60; 16 to 20 lb., \$61; 12 lb., \$62; 8 lb., \$63; angle bars, 3.25c., base.

Sheets.—One maker asks 10.50c. for No. 28 galvanized. Some mills are not quoting on black sheets and some have no galvanized to sell. One mill asks 7c. to 7.50c. Pittsburgh for No. 28 black and No. 10 blue annealed, while another quotes No. 10 blue annealed at 8.50c. to 10.50c. High prices are causing hesitancy to buy. One inquiry calls for about 150 tons for the construction of 5000 United States army field ranges, which also require bars and angles. While this is army work and must be cared for, no assurance of the fact comes from Washington. Nevertheless the order for sheets will be filled promptly by a Western mill. Jobbers' quotations are unchanged.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 7.50c.; No. 28 black, 7.50c., and No. 28 galvanized, 9.50c.

Rivets and Bolts.—No changes in prices or conditions can be reported.

Mill quotations are without change, as follows: Carriage bolts up to $\frac{3}{4}$ x 6 in., rolled thread, 40; cut thread, 35-2 $\frac{1}{2}$; larger sizes, 25; machine bolts up to $\frac{3}{4}$ x 4 in., rolled thread, with hot-pressed square nuts, 40-10; cut thread, 40; large size, 30; gimlet-point coach screws, 45; hot-pressed nuts, square, \$2.10 off per 100 lb.; hexagon, \$1.90 off. Structural rivets, $\frac{3}{4}$ to 1 $\frac{1}{4}$ in., 4.75c. to 4.93c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets, 5c.; boiler rivets, 5.10c.; machine bolts up to $\frac{3}{4}$ x 4 in., 40-10; larger sizes, 35-5; carriage bolts up to $\frac{3}{4}$ x 6 in., 40-2 $\frac{1}{2}$; larger sizes, 30-5; hot-pressed nuts, square, \$3, and hexagon \$3 off per 100 lb.; lag screws, 50 per cent off.

Bars.—For delivery this year, a large maker quotes 3.75c. to 4c. Pittsburgh, Chicago taking a freight rate of 1.89c. on mild steel bars. Another maker's minimum is 4c., Pittsburgh, and it asks up to 4.25c. The absolute minimum for high carbon bars is 3.50c. Chicago, but prices must advance in view of the extremely high prices for re-rolling rails. Iron bars are strong at 3.50c., Chicago. James Stewart & Company, May 25, took bids on 1000 tons of reinforcing bars for a Northern Central Railroad gain elevator at Baltimore, Md.

We quote prices out of store for Chicago delivery as follows: Soft steel bars, 4.50c.; bar iron, 4c.; reinforcing bars, 4.50c., base, with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting list plus 5 per cent to plus 10 per cent.

Cast-Iron Pipe.—Toledo will open bids tomorrow for 400 tons, and Akron will open bids June 1 for 223 tons.

Quotations are unchanged as follows per net ton, Chicago: Water pipe, 4 in., \$58.50; 6 in. and larger, \$55.50, with \$1 extra for class A water pipe and gas pipe.

Wire Products.—The leading interest has not announced any changes in prices. To jobbers it quotes as follows per 100 lb.:

Plain fence wire, No. 6 to 9, base, \$3.339; wire nails, \$3.389; painted barb wire, \$3.539; galvanized barb wire, \$4.239; polished staples, \$3.539; galvanized staples, \$4.239, all Chicago, carload lots.

Old Material.—Under the stimulus of heavy buying by the Steel Corporation, coupled with a growing scarcity of material and an insufficient number of gondola cars to move what is available, the scrap market has advanced in manner that might be termed wild. A railroad has sold re-rolling steel rails to a consumer at \$41.75, delivered. The only railroad list reported comes from the Chicago, Burlington & Quincy and em-

braces about 2000 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails.....	\$38.50 to \$39.00
Relaying rails.....	39.00 to 40.00
Old carwheels.....	33.00 to 35.00
Old steel rails, re-rolling.....	41.00 to 41.50
Old steel rails, less than 3 ft.....	37.50 to 38.00
Heavy melting steel scrap.....	32.00 to 33.00
Frogs, switches and guards, cut apart.....	32.00 to 33.00
Shoveling steel.....	29.50 to 30.50
Steel axle turnings.....	21.50 to 22.00

Per Net Ton	
Iron angles and splice bars.....	\$38.50 to \$39.00
Iron arch bars and transoms.....	39.50 to 40.00
Steel angle bars.....	32.50 to 33.00
Iron car axles.....	43.50 to 44.50
Steel car axles.....	42.50 to 43.50
No. 1 railroad wrought.....	36.00 to 37.00
No. 2 railroad wrought.....	33.00 to 34.00
Cut forge.....	33.50 to 34.00
Pipes and flues.....	22.25 to 23.25
No. 1 busheling.....	25.50 to 26.50
No. 2 busheling.....	19.00 to 20.00
Steel knuckles and couplers.....	32.50 to 33.50
Steel springs.....	34.00 to 35.00
No. 1 boilers, cut to sheets and rings.....	22.00 to 22.50
Boiler punchings.....	28.00 to 28.50
Locomotive tires, smooth.....	38.00 to 38.50
Machine-shop turnings.....	14.50 to 15.00
Cast borings.....	14.00 to 14.50
No. 1 cast scrap.....	26.00 to 27.00
Stove plate and light cast scrap.....	18.00 to 19.00
Grate bars.....	22.00 to 22.50
Brake shoes.....	22.00 to 22.50
Railroad malleable.....	26.50 to 27.00
Agricultural malleable.....	22.50 to 23.00

Philadelphia

PHILADELPHIA, PA., May 28.

With the steel mills sold up for months into the future and continued uncertainty with respect to pending Government orders, the market to-day presents few satisfying elements for the consideration of buyers. Steel salesmen no longer visit the trade; instead purchasing agents from all parts of the country are to be seen about the sales offices urging acceptance of their orders. Strength is everywhere apparent. More and more the mills are restricting bookings to such business as can be squeezed somehow into their schedules for regular customers and buyers consider it a favor to have any orders accepted.

Ferroalloys.—On small lots of ferromanganese up to 100 tons, \$400 to \$425 furnace has been done for deliveries over the remainder of this year. Uncertainty is a dominant phase of the market, and consumers generally are anxious with respect to future supplies.

Pig Iron.—Movement of basic pig iron totaled about 50,000 tons during the week, of which the Lukens Steel Company purchased 45,000 tons, about 20,000 tons for last half shipment and the remainder for deliveries into first half of 1918, at \$42 delivered. The last sale reported involved 5000 tons on a basis of \$42 furnace, establishing \$42.50 as the new minimum quotation in this market. There is no prompt low phosphorus iron for sale and recent sales of lots of several hundred tons were on a basis of \$82 Philadelphia for last quarter. In foundry grades, steady day to day business of relatively small tonnages has been done at an average price of \$45 furnace taking freight from 50c. to \$1.50 for prompt and last half shipment. The range until recently maintained of \$5 a ton on first half bookings is being gradually diminished and this week some Eastern Pennsylvania iron was sold at \$43.50 furnace for next year. In another case, \$42.90 delivered was done on 500 tons Eastern Pennsylvania No. 2 X for first half. Sizeable tonnage of prompt gray forge moved during the week at \$43 delivered. J. L. Mott & Co. are reported in the market for about 5000 tons of No. 2 X and No. 2 plain, and a part of this iron is said to have been placed for first half shipment at the ruling price. Some Virginia iron has been moving, but transactions noted during the past few days have involved small tonnage at a price range of \$45 to \$46 furnace for prompt. The Virginia Iron, Coal & Coke Company and Pulaski are still out of the market. Southern iron is not active in this market; one Alabama interest is quoting \$38 Birmingham for first half iron and one or two small sales are reported to have been made on this basis. Quotations for standard brands delivered in buyers' yards, for prompt

shipment, except as otherwise noted, range about as follows:

Eastern Pa. No. 2 X foundry.....	\$45.50 to \$46.50
Eastern Pa. No. 2 plain.....	45.00 to 46.00
Virginia No. 2 X foundry.....	45.75 to 46.75
Virginia No. 2 plain.....	45.25 to 46.25
Gray forge	43.00
Basic	42.50
*Standard low-phosphorus	82.00

*For last quarter shipment.

Plates.—Greater pressure than ever with upward revision of quotations on the part of leading independents featured the week's plate business. In the case of one Eastern mill, 8c. to 8½c., base Pittsburgh, is now being quoted for ordinary tank steel, and another important factor has announced 10c., base Pittsburgh, as its minimum for any kind of plates. The demand for contracts for the last half, or even the third quarter, increases daily, but mills are discouraging, and, in most cases, decline such business. Shipment is altogether a matter of mills' convenience. An inquiry for 15,000 tons was submitted recently to an Eastern mill with the notation, "are willing to pay fancy price," but the offer failed to bring out a single quotation.

Structural Material.—One mill has 160,000 tons of shapes on its books to get out over the next ten months, and a very considerable number of old customers left unsatisfied for last half requirements, which pictures the congestion everywhere being reported. This particular mill announces that no more special orders will be considered until present schedules are nearly out of the way. The minimum quotation for standard shapes is still nominally 4½c. among independents, but price no longer means anything, as shown by the fact that mills have turned down business offered right along at a premium. Two small bridges involving not more than 200 tons in all, for local divisions of the Pennsylvania Railroad, are in the market, which is the only development reported for the week under review.

Billets.—Mills are sold up for the remainder of the year. On rerolling billets as much as \$100 has been done for deliveries running into first quarter, while \$115 is the ruling quotation for forging billets.

Sheets.—Inquiry for sheets is very heavy, especially for Government work. The American Car & Foundry Co. is reported to be seeking a large tonnage of sheets, 13 gage, to be made up into tent stoves for the army. Usual quotations are on a basis of 7½c. to 8c. for No. 10 blue annealed. The mills generally are reported as sold up for this year.

Iron Bars.—Heavy specifications for bar iron appear in the market daily, and some good contracts have been made for the period expiring July 1 on a basis of 4.159c. f.o.b. Philadelphia for car lots. Where specifications for small lots crop up, sellers have adopted the practice of adding 25c. to the minimum quotation.

Old Materials.—Added strength is noted on scrap substitutes for pig iron with a further marking up of quotations on rails for rerolling, carwheels, forge fire, bundled sheets and cast borings. Eastern mills are taking in very little steel scrap, and quotations remain nominally the same as last week on a basis of \$26 to \$27 for No. 1 heavy melting steel, although as much as \$31.50 has been offered for Pittsburgh delivery. While it is a brokers' market with respect to scrap, the mills are buying other grades in a way to hold up the market well. Quotations covering eastern Pennsylvania and taking freight rates from 50c. to \$1.50 per gross ton, are about as follows:

No. 1 heavy melting steel.....	\$26.00 to \$27.00
Old steel rails, rerolling	35.00 to 36.00
Low phosphorus heavy melting steel	
scrap	40.00 to 42.00
Old iron and steel axles (for export) ..	47.00 to 48.00
Old iron rails	35.00 to 36.00
Old carwheels	30.00 to 31.00
No. 1 railroad wrought	42.00 to 44.00
No. 1 forge fire	20.00 to 21.00
Bundled sheets	20.00 to 21.00
No. 2 bushelings	16.00 to 16.50
Machine shop turnings	16.00 to 16.50
Cast borings	16.50 to 17.00
No. 1 cast	30.00 to 31.00
Grate bars, railroad	18.00 to 19.00
Stove plate	19.00 to 19.50
Railroad malleable	29.00 to 30.00

Coke.—For every coke transaction there appears a new price, and consumers have no easy time obtaining

needed supplies. One seller had inquiries for furnace coke for last half deliveries aggregating upward of 100,000 tons during the week, and was unable to quote. The usual quotation is now \$9 for spot furnace fuel.

Cleveland

CLEVELAND, OHIO, May 29, 1917.

Iron Ore.—With a view of relieving some of the pressure on transportation facilities both on the lakes and railroads, steps have been taken by the Lake Superior Iron Ore Association to curtail iron ore shipments during the season to actual requirement. Late last week, the association sent written requests to ore consumers, asking them to take only sufficient quantities of ore to run their plants until June 1, 1918. Furnaces are asked to advise the association how much ore they will require to run their furnaces from May 1 this year until June 1, next year, how much ore must be brought down the Lakes this season, how much must be shipped directly by rail and how much should be stored on Lake docks. If consumers follow the wishes of the ore shippers, shipments can be cut down considerably this season and the burdens of the carriers relieved to that extent. This would relieve materially the vessel situation, which is likely to become serious during the season, partly because of the late opening of the season of navigation and very light shipments so far owing to ice in Lake Superior which has prevented a normal movement through nearly all of May. Ore consumers are generally in a position to comply with the request to curtail shipments, as stocks in furnace yards and on docks May 1 were estimated at over 4,000,000 in excess of a year ago. Dock reports May 1 showed a balance of 1,460,000 tons over a year ago and the remainder of the excess is in furnace yards. Last year, many consumers, partly because of the expectation of higher prices this year, largely over-bought and these now have more than their normal supply of ore either in their yards or on the docks. We quote prices as follows, delivered lower Lake ports: Old Range Bessemer, \$5.95; Mesaba Bessemer, \$5.70; old range non-Bessemer, \$5.20; Mesaba non-Bessemer, \$5.05.

Pig Iron.—The market is fairly active, and prices still show an upward tendency. Foundry iron has sold in Cleveland at \$46 for No. 2 for this year's delivery, a local interest having marked up its Cleveland price to that figure for this year, and to \$45 for the first half of next year. A Cleveland seller has advanced its Valley quotation to \$44 for No. 2 for the first half, and a nearby foundry has taken 1000 tons at that price. A Canton consumer has purchased 6000 tons of basic iron for the first half of next year, the price being understood to be \$41. For this year's delivery basic is very firm at \$42. A West Virginia consumer is inquiring for 9000 tons of basic for the last half. We note the sale of 2000 tons of foundry iron by a Lake furnace to an Indiana consumer at \$42, and two 1000-ton lots of malleable iron at \$43, all for the first half. This interest has advanced its price to \$44 for foundry and malleable iron for this delivery. Another Lake furnace is quoting these grades at \$42 to \$43 for next year, and \$45 for this year. Several sales of southern Ohio iron are reported in this territory around \$42 for the first half. Ohio silvery iron is quoted as high as \$60 at furnace. Labor troubles have stiffened up the price. The freight rate on Southern pig iron to the Cleveland territory will be advanced 60c. per ton July 1 under the new tariff that has just been issued, and which is expected to be approved by the Interstate Commerce Commission. We quote, delivered Cleveland, as follows:

Bessemer	\$44.95
Basic	42.30
Northern No. 2 foundry.....	\$44.30 to 46.30
Southern No. 2 foundry.....	40.00 to 42.00
Gray forge	40.95
Ohio silvery, 8 per cent silicon.....	51.62 to 61.62
Standard low phos., Valley furnace...	70.00 to 75.00

Coke.—Foundry coke for prompt shipment has advanced, being quoted as high as \$11 per net ton by some producers. Quotations for contracts are hard to secure, many producers being so well sold up that they

have withdrawn from the market. The contract price is around \$9 to \$9.50.

Finished Iron and Steel.—There is an increased demand for steel for Government requirements, and the delivery situation is tighter. The call for plates is very heavy, and many consumers are trying to place third quarter contracts. A Cleveland mill has sold 1000 tons of tank plates at 8.50c., Pittsburgh, for last half. The usual minimum quotation is 8c., and as high as 10c. is being asked for ordinary tank plates. One Ohio tank shop is inquiring for 4000 tons. Among inquiries for steel for Government work is one for 20,000 tons of base bands for rims for motor trucks. There is considerable interest in sheet bars, which are quoted at \$110 by a Cleveland mill. This producer so far, however, has made no sales above \$100. The expected slump in the demand for steel for pleasure cars has materialized. Automobile plants are curtailing operations and holding up shipments on steel. The car situation has again become acute, and mills are having great trouble in moving steel except for the Government and export. Bar iron is firm at 3.70c., Cleveland. Local mills are getting numerous small orders for steel bars for export. The demand for sheets continues heavy, and prices are higher. We quote sheets at 7.50c. to 8.50c. for No. 28 black, 7.50c. to 8c. for No. 10 blue annealed, and 9.50c. to 10.50c. for No. 28 galvanized. Warehouse prices are 4.50c. for steel bars, 5c. for structural material, 7c. for plates, and 7.50c. for blue annealed sheets.

Bolts, Nuts and Rivets.—Bolt and nut specifications are heavy, and considerable business is being placed in contracts. While manufacturers are trying to limit contracts, a number have been taken for the entire last half. There is some shading from regular quotations. Rivet manufacturers in some cases are taking contracts for the last half at third quarter prices. Current orders have fallen off somewhat. We quote rivets at 4.75c., Pittsburgh, for structural, and 4.85c. for boiler rivets for June delivery, and \$3 a ton higher for the third quarter. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{3}{4}$ x 6 in., smaller or shorter, rolled thread, 40 off; cut thread, 35 and 2 $\frac{1}{2}$; larger or longer, 25. Machine bolts, with h. p. nuts, $\frac{3}{4}$ x 4 in., smaller or shorter, rolled thread, 40 and 10; cut thread, 40; larger and longer, 30. Lag bolts, cone point, 45. Square h. p. nuts, blank, \$2.10 off list; tapped, \$1.90 off list. Hexagon, h. p. nuts, blank, \$1.90 off; tapped, \$1.70 off. C. p. c. and t. hexagon nuts, all sizes, blank, \$1.60 off; tapped, \$1.40 off. Cold pressed semi-finished hexagon nuts, 50 and 10 off.

Old Material.—The market is very firm, unsettled and inactive. About the only trading is among dealers who are still covering on short orders. Most dealers are refusing to sell, believing that prices will go higher in a few days and some are asking prices considerably higher than those that have been prevailing. However, with a few exceptions, sales have not been made to establish the market at higher levels. Heavy melting steel has been marked up \$1 a ton and as high as \$30 is being asked for this grade. Borings and turnings are higher and the former are quoted from \$16 to \$17, gross, for Pittsburgh delivery. We note the sale of a small lot of railroad wrought at \$33 net, a 50c. advance over recent quotations. We quote f.o.b. Cleveland as follows:

Per Gross Ton	
Steel rails	\$26.50 to \$27.00
Steel rails, rerolling	37.00 to 38.00
Steel rails, under 3 ft.	32.00 to 33.00
Iron rails	33.00 to 34.00
Steel car axles	45.00 to 47.00
Heavy melting steel	28.00 to 29.00
Carwheels	23.50 to 24.00
Relaying rails, 50 lb. and over	43.00 to 45.00
Agricultural malleable	18.50 to 19.00
Railroad malleable	24.00 to 25.00
Light bundled sheet scrap	17.75 to 18.50

Per Net Ton	
Iron car axles	\$46.00 to \$47.00
Cast borings	12.50 to 13.00
Iron and steel turnings and drillings	12.00 to 12.25
No. 1 bushing	21.00 to 22.00
No. 1 railroad wrought	32.50 to 33.50
No. 1 cast	23.50 to 24.50
Railroad grate bars	16.50 to 17.00
Stove plate	16.50 to 17.00

The Donner Steel Company, Buffalo, has filed plans for the extension of a machine shop, a roll shop, a mill building and an oil house, the aggregate cost of which will be about \$100,000.

St. Louis

ST. LOUIS, Mo., May 28, 1917.

Pig Iron.—The call for pig iron during the past week has shown some developments in the direction of a demand for basic from the big consumers who have been thought to be supplied, but no very large transactions were closed. One sale of 3000 tons of Southern was made for 1918 delivery on a price of \$38 Birmingham, and an inquiry for 3600 tons from an Iowa consumer is still in the market. Other reports of demand for pig indicate that the smaller consumers are thoroughly alarmed, but they are getting very little satisfaction, as the furnaces are presenting a united front as to deliveries, being reported sold up to a very large extent. The local furnace is understood to be entirely out of the market for 1917 and more than half sold up for 1918. Total sales, aside from the basic transactions, aggregated probably 5000 tons of all grades and mostly in small quantities. The smaller foundries which have only recently begun to realize that the question is one of supply and not of price are finding themselves in a very serious situation, one reporting, as an example, last week, that it had been able to get no iron at all for its needs in July, even on an offer of \$50 per ton. The figures made here are subject to furnace confirmation, and are about on a basis of \$38 for 1918 delivery, No. 2 Southern, Birmingham, while last quarter may be had in very limited amounts at about \$42 Birmingham. No Northern or Chicago iron is being offered.

Old Material.—The excited condition of the scrap market was accentuated during the week and there was a continuance of efforts to buy old material, not alone by the dealers but by outside interests as well. The scramble, for such it appeared to be in the light of the small supplies available, resulted in sharp advances in prices, and although quotations are given the transactions closed are being largely completed on the basis of the needs of the buyer and the ability of the seller to hold out for his price. The railways are offering no material and probably would be unable to collect and load it if they had any quantity, as equipment is scarce and labor is difficult to get. There is also trouble over the short supply of gondola cars and the consequent inability to load and unload other equipment as rapidly, thus interfering with efficient operation. Local consumers have been practically barred from the market by the excited situation, and are also inclined to wait until the spasm subsides, though many of them are known to be in need of material. The uncovering of short interests during the past two weeks has also had its influence on prices. Altogether it is any man's guess as to what the market will do next. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	\$34.00 to \$35.00
Old steel rails, rerolling	38.50 to 39.00
Old steel rails, less than 3 ft.	34.50 to 35.00
Relaying rails, standard section, subject to inspection	45.00 to 46.00
Old carwheels	31.50 to 32.00
No. 1 railroad heavy melting steel scrap	30.50 to 31.00
Heavy shoveling steel	27.50 to 28.00
Ordinary shoveling steel	28.00 to 28.50
Frogs, switches and guards cut apart	31.50 to 32.00
Ordinary bundled sheet scrap	17.00 to 17.50
Heavy axle and tire turnings	19.50 to 20.00

Per Net Ton	
Iron angle bars	\$34.50 to \$35.00
Steel angle bars	28.50 to 29.00
Iron car axles	45.00 to 46.00
Steel car axles	42.00 to 43.00
Wrought arch bars and transoms	36.00 to 36.50
No. 1 railroad wrought	33.00 to 33.50
No. 2 railroad wrought	32.00 to 32.50
Railroad springs	30.00 to 30.50
Steel couplers and knuckles	30.00 to 30.50
Locomotive tires, 42 in. and over, smooth inside	40.00 to 40.50
No. 1 dealers' forge	25.00 to 26.00
Cast iron borings	14.00 to 14.50
No. 1 bushing	25.00 to 25.50
No. 1 bolers, cut to sheets and rings	22.50 to 23.00
No. 1 railroad cast scrap	22.50 to 23.00
Stove plate and light cast scrap	16.00 to 16.50
Railroad malleable	23.00 to 23.50
Agricultural malleable	18.50 to 19.00
Pipes and flues	19.50 to 20.00
Heavy railroad sheet and tank scrap	19.50 to 20.00
Railroad grate bars	17.50 to 18.00
Machine shop turnings	14.50 to 15.00

Coke.—Coke for future delivery has stiffened to \$10 Connellsville for best selected 72-hour foundry on future

contracts, while spot coke is practically unobtainable at any price at this point. By-product coke is absolutely out of the market.

Finished Iron and Steel.—In finished products, consumers are trying very hard to get their contract shipments forward and are asking also for some increases in quantities, but are meeting with no encouraging replies from the mills. Light rails have become much more extended in delivery, running about eight months ahead now. No standard section business appeared during the week. Track fastenings are being urged forward on contracts, but no attempt is being made to enter into new contracts because of the present delivery situation and the firmness of prices. Movement of stock out of warehouse continues very large, and we quote for such stock: Soft steel bars, 4.55c.; iron bars, 4.50c.; structural material, 5.05c.; tank plates, 6.55c.; No. 10 blue annealed sheets, 7.55c.; No. 28 black sheets, cold rolled, one pass, 7.85c.; No. 28 galvanized sheets, black sheet gage, 10c.

Birmingham

BIRMINGHAM, ALA., May 28, 1917.

Pig Iron.—The feature of the week closing May 26 was the flat-footed announcement by the leading foundry pig iron producer of a basis of \$42 for spot and last half and \$38 for first half of 1918, this being a jump of \$2 per ton on each delivery during the week. The quotation for 1918 is joined in by the leading interest and the next largest makers, while a small concern, which has sold as far into 1918 as it cares to do just at this time, has advanced to a level of \$40 for that delivery. The real advance has been in 1918 iron, sales during the week extending from May 13 to 19, having been made at \$34, \$35, \$36, \$37 and \$37.50 by one concern. Others probably did likewise. By May 20, iron for 1918 was hardening at \$38. With all that, a lot of 300 tons, on which \$38 was offered by one maker, was taken by another at \$37. Differences such as these are due to a variety of causes, the personnel of the customer and his desirability cutting considerable figure. Several small lots of spot have brought from \$40 to \$42, but it is possible that especially good customers might still obtain fill-in lots at as low as \$39. The disposition to bring all quotations to the one level of \$40 is general. This is largely because there is almost no spot and last half is very well taken care of. The leading interest is out of the market except for 1918 delivery.

We quote, per gross ton, f.o.b. Birmingham district furnaces, for nearby delivery, as follows:

No. 1 foundry and soft.....	\$39.50 to \$41.50
No. 2 foundry, and soft.....	39.00 to 41.00
No. 3 foundry.....	38.50 to 40.50
No. 4 foundry.....	38.25 to 40.25
Gray forge	38.00 to 40.00
Charcoal	44.00 to 46.00

Steel Bars.—Steel bars, f.o.b. Birmingham, in car lots, 3.75c. to 4c.; iron bars, 3.45c. to 3.65c.

Cast-Iron Pipe.—The cast-iron pipe market remains inactive owing to high prices. However, the National Cast Iron Pipe Company secured a 250-ton order from Milwaukee, while the leading interest has picked up several Government orders for its Chattanooga plant. There is expectation of more Government orders. We quote, per net ton, f.o.b. Birmingham yards, as follows: 4-in., \$53; 6-in. and upward, \$50, with \$1 added for gas pipe and special lengths.

Coal and Coke.—The demand for coal cannot be supplied owing to car shortage. Prices remain around \$2.50 to \$3.50 for milling steam coal, with \$5 to \$6 for good blacksmithing coal. Coke remains at \$14 for standard beehive foundry spot makes and \$12.50 and higher on contracts for the remainder of the year. Furnace coke sells at \$6 to \$8 per ton. Spot cokes of any kind are extremely difficult to secure.

Old Material.—The scrap dealers are enjoying an excellent business as to volume and prices are firm and regular. Country scrap is coming in in large quantities owing to the ransacking of farms for worn-out machinery, etc. The business is on a sound basis, with

heavy movements. We quote, per gross ton, f.o.b. Birmingham district yards, as follows:

Old steel axles	\$35.00 to \$36.00
Old steel rails	20.50 to 21.50
No. 1 wrought	22.50 to 23.00
No. 1 heavy melting steel	17.50 to 18.00
No. 1 machinery cast	19.50 to 20.50
Carwheels	17.50 to 18.50
Tram carwheels	16.00 to 16.50
Stove plate and light	14.50 to 15.00
Turnings	9.25 to 9.75

New York

NEW YORK, May 29, 1917.

Pig Iron.—The market is strong and active, especially in basic. A New Jersey buyer has taken 5000 tons of basic for delivery in July, August and September. A Connecticut buyer of basic is in the market for from 2000 to 3000 tons per month for its requirements for at least the first quarter of next year and it may buy for first half of the year; hence the inquiry is for from 6000 to 18,000 tons, and the amount bought will doubtless depend largely on the price named. The American Locomotive Company has purchased 8000 tons of No. 2 plain and 2000 tons of basic for delivery throughout the first half of 1918. The iron will come largely from the Buffalo district and it is understood that the price for basic and foundry was the same, about \$41, furnace. In foundry iron, an up-state melter has taken 1000 tons for first half and one firm has sold 1500 tons of Pennsylvania irons for delivery at various times the remainder of this year and the first half of next. A Massachusetts concern is in the market for 2000 tons of foundry and numerous minor inquiries are pending. Foreign inquiry includes one for 6000 tons of low phosphorus, one for 1000 tons of low phosphorus and one for 4000 tons of special Bessemer. We quote, tidewater, for early delivery as follows:

No. 1 foundry.....	\$46.75 to \$47.25
No. 2 X.....	45.75 to 46.25
No. 2 plain.....	45.25 to 45.75
Southern No. 1 foundry.....	44.75
Southern No. 2 foundry and soft.....	44.25

Ferroalloys.—It is understood that the canvass of the alloy committee of the Council of National Defense has brought out some very interesting data concerning the ferromanganese situation in this country. One fact is that independent steel makers have at least 3 months' supply on hand. The market in the past week has been extremely quiet with very few inquiries or sales. Quotations are unchanged from last week, \$425 to \$450 delivered being asked for spot and nearby and \$400 to \$425 for delivery any time this year, with doubt expressed as to whether any alloy could be obtained for less than \$425, delivered. Spiegeleisen, 20 per cent, is very strong at \$80 to \$85, furnace, for any delivery this year. One large importer of British ferromanganese has a fair amount of British spiegeleisen available for delivery this year. Ferrosilicon, 50 per cent, is strong and active at \$200 to \$250, delivered.

Finished Iron and Steel.—Efforts to get deliveries of material long since ordered rather than attempts to place fresh orders are resulting in a decidedly nominal condition for prices of material for fresh purchases for early shipment. Every week seems to put another company in the classification of those substantially out of the market. The difficulty of getting plates is still accentuated by the delay in making the apportionment among plate mills of the plates for the United States Shipping Board. Movement on account of export is getting increasingly difficult, owing to the secrecy surrounding the sailings of ocean-going vessels, the difficulty being chiefly one of extra effort and time consumed in effecting arrangements. Chief interest doubtless lies in the buying of shells by the Government, an award, for example, being expected any moment on 7,500,000 shells for field artillery. For the detonators for these shells some 5000 tons of steel alone will be needed. In structural material Government orders and inquiries cover the bulk of the transactions in a very quiet market. The Government has asked for bids on 2000 tons for power houses at the Norfolk and League Island Navy yards; on 2500 tons for another foundry at the League Island Navy Yard, and on about 4000 tons for

a structural shop at the Brooklyn Navy Yard. Contracts have been let to George F. Wyne, Washington, the lowest bidder, for 3200 tons for a machine shop at the Norfolk Navy Yard and for 2000 tons for a foundry at the same yard. His bid was \$100 a ton, erected, for the machine shop and \$102 per ton for the foundry, with the highest bid at \$148 per ton, erected. The Penn Bridge Company has been awarded 250 tons for a naval storage house at New Orleans; the McClintic-Marshall Company about 4000 tons for a crane runway at the Brooklyn Navy Yard and the Virginia Bridge & Iron Co. 1100 tons for the hangars at the aviation station at Pensacola, Fla. The Newport News Shipbuilding & Dry Dock Company is inquiring for 9000 tons for extensions to its plants and crane runways to care for new ships which it is to build. The Pennsylvania Railroad is in the market for 600 tons for four bridges, bids on which will go in on June 1. Other new contracts which have been recently taken are as follows: 1100 tons to Milliken Brothers, Inc., for the Stanley Theater at Philadelphia; 1500 tons to the American Bridge Company for the Babcock & Wilcox Company; 400 tons for a bridge at Trenton, N. J., for the Philadelphia & Reading, to the McClintic-Marshall Company, and 500 tons to the Hedden Iron Construction Company for the Union Smelting & Refining Company, Newark, N. J. The Pennsylvania Railroad has awarded about 1300 tons to miscellaneous fabricators for 10 bridges, 3 signal bridges and repairs to 4 bridges, and 450 tons have been placed for 7 bridges for the New York Central. We quote plain material from mill at 4.419c. to 4.919c., New York, the lower price in three to four months and the higher for small lots in earlier deliveries. For future shipments, 4.169c. seems to be the minimum. Shipments from warehouses are 5c. per pound, New York. On mill shipments of universal and tank plates the range is 7.169c. to 8.169c., New York, with little available before the last quarter, and ship plates are 8.169c. and higher, New York. Some 11,000 to 12,000 tons have lately been sold for export, details not known; but a 1000-ton order for tank plates has been offered to a mill at 8c. for immediate shipment. Plates out of store are 7.50c., New York. We quote steel bars at 4.169c. to 4.669c., New York, and iron bars at 4.169c., New York. From New York district warehouses iron bars are sold at 4.60c. and steel bars at 4.75c.

Cast-Iron Pipe.—Owing to the recent rapid advance in the price of pig iron, further advances of cast-iron pipe are confidently expected and may be announced before the end of the week. Carload lots of 6-in., class B and heavier, are, however, still quoted at \$55.50 per net ton, tidewater, with class A and gas pipe taking an extra of \$1 per ton.

Old Material.—Old material dealers are being warned that they must load cars to full capacity. Owing to the scarcity of cars, the Government is expected to insist upon full loading. The market is strong especially in heavy melting steel for shipment to the Pittsburgh district, and it is quoted fully \$1 higher. Brokers quote buying prices as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (for shipment to eastern Pennsylvania).....	\$23.00 to \$23.50
Old steel rails (short lengths) or equivalent heavy steel scrap.....	26.00 to 27.00
Relaying rails	44.00 to 45.00
Rerolling rails	35.00 to 35.50
Iron and steel car axles.....	46.00 to 47.50
No. 1 railroad wrought.....	40.50 to 41.50
Wrought-iron track scrap.....	36.00 to 37.00
No. 1 yard wrought, long.....	33.50 to 34.00
Light iron	7.50 to 8.00
Cast borings (clean)	13.50 to 14.00
Machine-shop turnings	12.50 to 13.00
Mixed borings and turnings.....	12.25 to 12.75
Wrought-iron pipe (not galvanized or enameled)	21.00 to 22.00

Foundry scrap is in fair demand, but there is not the activity that is found in heavy melting steel. Dealers in New York City and Brooklyn are quoting as follows to local foundries, per gross ton, New York:

No. 1 machinery cast.....	\$29.00 to \$30.00
No. 1 heavy cast (column, building material, etc.)	26.00 to 26.50
No. 2 cast (radiators, cast boilers, etc.)	22.00 to 23.00
Stove plate	17.50 to 18.00
Locomotive grate bars	17.50 to 18.00
Old carwheels	27.00 to 28.00
Malleable cast (railroad).....	24.00 to 24.50

Buffalo

BUFFALO, N. Y., May 29, 1917.

Pig Iron.—Inquiry of quite large aggregate is before the market covering all grades, but most furnaces are unable to entertain the taking on of very much additional tonnage on account of being sold up well into the future and having very little 1917 iron remaining on which to quote. However, sales totaling over 15,000 tons were closed during the week. While the market is steady, rather more than ordinary interest has been shown during the week and although the general trend of prices is upward, no material change from the schedule reported last week has taken place. The ruling price for No. 2 X foundry still continues at \$46 for prompt and second-half delivery this year. One lot of high silicon iron is reported sold at \$48 for the first half of 1918. One producer has now discontinued 1918 quotations and is limiting its quotations to exclude anything more extended than three months' shipment. For 1917 delivery we quote as follows, f.o.b. furnace, Buffalo:

High silicon irons	\$48.00
No. 1 foundry	47.00
No. 2 X foundry	46.00
No. 2 plain	45.50
No. 3 foundry	45.00
Gray forge	45.00
Malleable	47.00
Basic	47.00
Lake Superior charcoal, f.o.b. Buffalo.....	\$52.00 to 53.50

Finished Iron and Steel.—The market is still marking time, mills and agencies being unable to take on much tonnage for commercial purposes until Government specifications are definitely decided upon. A number of tentative inquiries have come into the market from manufacturers who are bidding on Government work, and attached to practically all of these inquiries is the question of special delivery to meet Government requirements. The demand for cold-rolled steel is heavy and deliveries of this product are becoming more extended. The demand is also extremely heavy for tin plate, with almost nothing to sell. The minimum tin plate price appears to be from \$9.50 to \$10 per base box. Mill prices for bars are nominally 3.75 to 4c.; for structural shapes, 4 to 4½c., ship plates commanding as high as 10½c.

Old Material.—The market is exceedingly strong all along the line, with large inquiry and with sales being made in most of the commodities on the list. Heavy melting steel has advanced \$1 per ton, good-sized transactions being reported. Dealings in old car wheels, iron rails and borings and turnings have also been of good volume, with advances of \$1 per ton on car wheels; \$2 per ton on low phosphorus and No. 1 railroad wrought; \$1.50 to \$2 on iron rails and wrought pipe and 50c. per ton on clean cast borings.

We quote dealers' asking prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel.....	\$29.00 to \$30.00
Low phosphorus	38.00 to 40.00
No. 1 railroad wrought.....	39.00 to 40.00
No. 1 railroad and machinery cast.....	29.00 to 30.00
Iron axles	45.00
Steel axles	45.00
Carwheels	27.50 to 28.50
Railroad malleable	27.50 to 28.50
Machine shop turnings	13.00 to 13.50
Heavy axle turnings	19.50 to 20.00
Clean cast borings.....	15.00 to 15.50
Iron rails.....	31.00 to 32.00
Locomotive grate bars	18.00 to 18.50
Stove plate	18.50 to 19.00
Wrought pipe	18.50 to 19.00
No. 1 busheling scrap	23.00 to 23.50
No. 2 busheling scrap	14.00 to 14.50
Bundled sheet scrap	16.50 to 17.00

A regulation in force in Australia prohibits the sale of tin plates to any person who is not duly licensed to purchase them. This means that country storekeepers are debarred from buying unless they first obtain the necessary license from Melbourne. In view of the hardship thus inflicted the Brisbane Chamber of Commerce has decided to ask the Commonwealth Government to permit the local price adjuster to issue the necessary licenses authorizing storekeepers to purchase tin plates, thus saving the time and trouble that would be involved in securing the requisite license at headquarters.

BRITISH IRON MARKET

Ferromanganese Is Scarcer—Tin Plates Stronger —American Steel Unobtainable

LONDON, ENGLAND, May 8, 1917.—It is suggested in some quarters that the demand for shell steel has become less insistent. At the same time, shipbuilding needs have been intensified and greater efforts are being made, especially in Scotland, to supply the large quantities called for. The providing of supplementary labor to strengthen operations at furnaces and mills has seriously engaged the attention of the authorities, and the developments proceeding are looked forward to with confidence, while raw materials are reaching manufacturers identified with Government work on a more regular scale. Allocation of supplies to the home trade and export business are as restricted as ever. Continental Allies' needs are still heavy.

The pig-iron situation is unchanged. It remains very firm, the pressure for basic iron being unrelaxed. Idle furnaces are being restarted where possible, though the labor problem still presents many difficulties. Maximum rates for all classes of pig iron show no alteration, recent efforts to obtain some revision, following the advance recently granted in Cleveland iron, having proved abortive. Deliveries of Cleveland iron, allocated to the home trade for this month, have been on a freer scale and new purchases have thus been stimulated, but few far forward contracts are being arranged. Due to improved transportation, arrears of deliveries against old contracts have been lessened, and the outlook is considered satisfactory. Exports, however, are still held up by lack of tonnage, the total clearances from the Tees for April being only 37,297 tons, or 16,248 tons short of the previous month. Home consumers' needs in hematite are being met on an adequate scale, but shipments to Allies are in arrears. New export business is held back by the reluctance of makers to take orders at current quotations, which are not high enough for the present high cost of production.

The domestic output of raw steel, though fully maintained, is chiefly absorbed by the unceasingly big outlet for war work, and the filling of requirements in other directions continues somewhat difficult. There is a keen demand for surplus lots of shell discard billets for which terms are secured about equal to the official price of Welsh sheet bars of £10 7s. 6d. Business in American material has remained virtually at a standstill. For weeks past no c.i.f. offers have been heard of, while the f.o.b. prices occasionally asked, either for billets or wire rods, against fresh inquiries for British and Continental account, are so high as to prohibit business. The question of freightage, moreover, is intensely complicated, owing to the unfortunate handling of the entire shipping position.

Business in finished iron and steel is restricted to the limited tonnage of material available after providing for current needs, including shipbuilding steel. Merchant trading thus remains at a standstill. The tendency is strong, although prices have not undergone any notable change. There is plenty of inquiry for American material, especially ship plates, which are now practically unobtainable. Wire nails afloat to France were recently sold at 38s. per 100 lb.

Ferromanganese Growing Scarcer

The attempts made lately to place further orders for ferromanganese have elicited the fact that sellers have practically vanished. As stated in our previous letter, British producers are heavily sold ahead and it is much more difficult than before to obtain licenses. Inquiries are still coming in on Continental and transatlantic account, but business is almost impossible. The tendency is undoubtedly much stronger, with f.o.b. prices for loose ranging nominally from £40 upward. Bids of £41 and more from Spain have been refused, and it is impossible to furnish reliable quotations. There is a small business passing in Indian manganese ores, the negotiation of orders being handicapped by tonnage difficulties.

Tin plates have been growing stronger steadily. Output is being kept down under the steel restrictions.

Prompt delivery plates are becoming scarce and command a moderate premium. It is certainly more difficult to get orders through, the works being full up to July and the nearest quotation being 29s., basis f.o.b. against war work, with business done at 60s., double boxes for prompt delivery. Stock lots on the free list, or obtainable without certificates, seem to have vanished. There is an inquiry for good lines of oil plates in connection with war needs, but makers are fully booked.

PIG IRON VERY ACTIVE

Negotiations Pending for Large Quantities of Steel-Making Grades

PITTSBURGH, May 29 (By wire).—Some heavy negotiations are on for large quantities of Bessemer and basic iron, and it is expected that several deals for both Bessemer and basic will be put through this week at prices very much higher than what are regarded now as the market, which are \$42 for basic and \$45 for Bessemer iron at Valley furnace. The available supply of Bessemer and basic iron is very short, and any concerns that must have either Bessemer or basic will have to pay just what the furnaces ask, which may be upward of \$50 at furnace for both grades. About two weeks ago, the Struthers Furnace Company sold 10,000 tons of basic iron to a Massillon, Ohio, consumer at \$40 furnace, for first half of 1918 delivery. It would be absolutely impossible to buy basic iron at this price today, and it is doubtful whether it could be obtained at any price for next year delivery.

Follansbee Brothers Company are in the market for 9000 tons of basic for last half of this year delivery, but have not yet closed. This iron is expected to bring a much higher price than has yet actually been done in basic. The Westinghouse Machine Company has closed for 6000 to 8000 tons of various grades of foundry iron for last half of this year and first half of next year on the basis of about \$43 at Valley furnace for No. 2 iron.

New Sheet Mills in Operation

PITTSBURGH, May 29 (By wire).—Monday morning, May 28, four of the eight hot-sheet mills in the new plant of the Mahoning Valley Steel Company at Niles, Ohio, were put in operation, and the other four mills are expected to start about July 1. This new plant is rolling a very large quantity of sheets for the Ford Motor Company, Detroit, Mich. Jacob D. Waddell, formerly of the Brier Hill Steel Company, Youngstown, Ohio, is president, and A. C. Prugh, formerly with a sheet mill at Leechburg, Pa., has been made general superintendent of the new plant.

Cincinnati

CINCINNATI, OHIO, May 28, 1917.

Pig Iron.—It is rumored that a near-by melter has purchased a round tonnage of Northern iron for first-half shipment. Northern basic foundry and malleable are now firmly established at \$43, Ironton basis, for this year's shipment and \$42 for next year. Some sales of Foundry iron have been made at these prices. Southern iron continues to grow stronger and is quoted at \$38, Birmingham, for first-half shipment, 1918. Some iron for strictly last-quarter delivery could also be purchased at the same figure. However, the general quotation for this year is \$40. The inquiry is light and sales of both Northern and Southern iron are confined mainly to small-sized lots. The car situation is becoming worse, and there is no relief in sight. The situation is exasperating, as one day embargoes are removed only to be put back on again, sometimes the next day. Ohio Silvery is quoted for next year at \$50, furnace, based on an 8 per cent analysis, but lately few contracts have been made. It is extremely hard to get any Silvery iron for shipment this year with the exception of a few carload lots for prompt movement. Miami furnace at Hamilton expects to blow in June 6.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, 1/4 in. thick and over, and tees 3 in. and over, 4c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than 1/4 in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, 1/4 in. thick, 6 in. up to 100 in. wide, 6c. to 7c. base, net cash, 30 days, or 1/2 of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50
Marine steel, special extras and prices on application.	

Gage Extras	Cents per lb.
Rectangular, 1/4 in. thick, over 6 in. wide to 100 in. wide. Base	
Lighter than 1/4 in., to 3/16 in., up to 72 in. wide	.10
*Lighter than 1/4 in., including 3/16 in., over 72 in. to 84 in.	.20
*Lighter than 1/4 in., including 3/16 in., over 84 in. to 96 in.	.30
*Lighter than 1/4 in., including 3/16 in., over 96 in. to 100 in.	.40
*Lighter than 1/4 in., including 3/16 in., over 100 in. to 102 in.	.45
*Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84 in.	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96 in.	.35
*Lighter than No. 8, including No. 10, up to 60 in. wide	.30
*Lighter than No. 8, including No. 10, over 60 in. to 64 in.	.35
Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered 1/4 in.	
Over 72 in. must be ordered 1/4 in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.	
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.	
Over 72 in., ordered weight 3/16 in., take No. 8 price.	
Over 72 in., ordered weight No. 8, take No. 10 price.	

Width Extras	Cents per lb.
Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras	Cents per lb.
Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras	Cents per lb.
No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in. (width extra)	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.
Wire Rods.—Including chain rods, \$90 to \$95.
Wire Products.—Prices to jobbers, effective April 20:
Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$3.45; galvanized, \$4.15. Galvanized barb wire and staples, \$4.35; painted, \$3.65. Wire nails, \$3.50. Galva-

nized nails, 1 in. and longer, \$2.20 advance over base price; shorter than 1 in., \$2.70 advance over base price. Cement coated nails, \$3.40. Woven wire fencing, 48 per cent off list for carloads, 47 off for 1000-rod lots, 46 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from May 1, 1917, all full weight:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/8, 1/4 and 3/8	42	15 1/2	1/8 and 1/4	30	3
1/2	46	31 1/2	3/8	31	4
3/4 to 3	49	35 1/2	1/2	35	17
			3/4 to 1 1/2	38	22
Lap Weld			Lap Weld		
2	42	29 1/2	1 1/4	23	8
2 1/2 to 6	45	32 1/2	1 1/2	30	16
7 to 12	42	28 1/2	2	31	17
13 and 14	32 1/2	..	2 1/2 to 4	33	20
15	30	..	4 1/2 to 6	33	20
			7 to 12	32	19
Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
1/8, 1/4 and 3/8	38	20 1/2	1/8, 1/4 and 3/8	29	12
1/2	43	30 1/2	3/8	34	21
3/4 to 1 1/2	47	34 1/2	1/2	38	23
2 to 3	48	35 1/2	3/4 to 1 1/2	38	23
Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
2	40	28 1/2	1 1/4	24	9
2 1/2 to 4	43	31 1/2	1 1/2	30	16
4 1/2 to 6	42	30 1/2	2	32	19
7 to 8	38	24 1/2	2 1/2 to 4	34	22
9 to 12	33	19 1/2	4 1/2 to 6	33	21
			7 to 8	27	15
			9 to 12	22	10

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized, but in some sections of the country discounts on less than carloads are three (3) points less (higher price) than the carload discount on both black and galvanized steel pipe.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are four (4) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe and five (5) points lower (higher price).

Boiler Tubes.—Nominal discounts on less than carloads, freight added to point of delivery, effective from Nov. 1, 1916, on standard charcoal iron tubes, and from April 2, 1917, on lap-welded steel tubes are as follows:

Lap Welded Steel	Standard Charcoal Iron
1 1/4 and 2 in.	31
2 1/4 in.	28
2 1/2 and 2 3/4 in.	34
3 and 3 1/4 in.	34
3 1/2 to 4 1/2 in.	34
5 and 6 in.	33
7 to 13 in.	30
1 1/2 in.	23
1 3/4 and 2 in.	35
2 1/4 in.	32
2 1/2 and 2 3/4 in.	38
3 and 3 1/4 in.	43
3 1/2 to 4 1/2 in.	No quotations
5 and 6 in.	37
7 to 13 in.	34

Above discounts apply to standard gages and to even gages not more than four gages heavier than standard in standard lengths.

Locomotive and steamship special charcoal grades bring higher prices.

1 1/4 in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

[Open-hearth stock, \$5 per ton above these prices.]	
Blue Annealed—Bessemer	
	Cents per lb.
Nos. 3 to 8	6.75 to 7.00
Nos. 9 and 10	7.00 to 7.25
Nos. 11 and 12	7.25 to 7.50
Nos. 13 and 14	7.50 to 7.75
Nos. 15 and 16	7.75 to 8.00
Box Annealed, One Pass Cold Rolled—Bessemer	
Nos. 17 to 21	6.80 to 7.30
Nos. 22 and 24	6.85 to 7.35
Nos. 25 and 26	6.90 to 7.40
No. 27	6.95 to 7.45
No. 28	7.00 to 7.50
No. 29	7.05 to 7.55
No. 30	7.15 to 7.65
Galvanized Black Sheet Gage—Bessemer	
Nos. 10 and 11	8.00 to 8.50
Nos. 12 and 14	8.10 to 8.60
Nos. 15 and 16	8.25 to 8.75
Nos. 17 to 21	8.40 to 8.90
Nos. 22 and 24	8.55 to 9.05
Nos. 25 and 26	8.70 to 9.20
No. 27	8.85 to 9.35
No. 28	8.90 to 9.50
No. 29	9.25 to 9.75
No. 30	9.50 to 10.00
Tin-Mill Black Plate—Bessemer	
Nos. 15 and 16	6.80 to 7.30
Nos. 17 to 21	6.85 to 7.35
Nos. 22 to 24	6.90 to 7.40
Nos. 25 to 27	6.95 to 7.45
No. 28	7.00 to 7.50
No. 29	7.05 to 7.55
No. 30	7.05 to 7.55
Nos. 30 1/2 and 31	7.10 to 7.60

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery						
Copper, New York		Tin.	Lead		Spelter	
May	Lake	Electro-lytic	New York	New York	St. Louis	New York
23.....	31.50	31.50	65.50	11.12½	11.00	9.50
24.....	31.50	31.50	65.25	11.25	11.10	9.50
25.....	31.50	31.50	65.00	11.37½	11.22½	9.50
26.....	31.75	31.75	...	11.37½	11.22½	9.62½
28.....	32.25	32.25	65.00	11.37½	11.22½	9.62½
29.....	32.50	32.50	...	11.37½	11.22½	9.62½

New York, May 29, 1917.

The leading metals are all higher. Copper is firm with a stronger tone. Tin is quiet and steady and a little easier. Lead is very strong and continues to advance. Sales of spelter are few, but the tone is strong. Antimony is easier and a little lower.

New York

Copper.—While the market is quiet, it is daily manifesting more strength, but as a whole is uninteresting. A little business, mostly for June and July delivery, is reported, but the volume is not large. Large producers are practically sold up through July and metal obtainable previous to Aug. 1 comes mostly from second hands. Demand for third quarter, particularly August-September delivery, is reported by some dealers as stronger, and this is further indicated by the fact that quotations are a little higher for future positions than last week. Some are now quoting 30c. for third quarter, with fourth quarter at 28c. to 29c., New York. Spot and May metal is largely nominal at 33c., New York. The quotation to-day for both Lake and electrolytic for nearby delivery is 32.50c., New York. Spot electrolytic in London is apparently unchanged, the last quotation reported having been £142 last Saturday.

Tin.—Large arrivals have caused an easier situation and a better feeling in the tin market in the last few days. Arrivals up to and including May 28 were 5295 tons, which is fairly large considering shipping conditions. The quantity afloat was 1977 tons. So far as the proposed duty of 10 per cent on tin is concerned, opinion in the trade seems to be divided, but the majority appear to think that finally tin will come in without tax or duty. Yesterday the market was very stale, with practically no business transacted. In fact, the market for the past week has been generally dull with few sales reported. On May 23 spot Straits was sold at 65.50c., New York, and on May 24 at 65.25c. The quotation yesterday was 65c., New York, but the market was dull and flat. Banca tin last week was offered May 23 at 63c., ex-steamer at dock, and May 24 spot Banca was offered at 62.50c., but there were no buyers.

Lead.—The market is very strong. On moderate sales, prices have risen the past week, due to a large demand but small supplies. Pending some definite knowledge as to the Government's needs, large producers continue to remain more or less out of the market. The quotation to-day is 11.22½c., St. Louis, and 11.37½c. New York. Business in Mexican lead is reported in fair volume the last week, and at full prices in bond.

Spelter.—The market is dull and demand is light. Large producers are inclined to hold back, which accounts for the firmness of the metal. Futures excite more interest than spot, and near-by, and they are really higher now than the earlier positions. As high as 9.50c., St. Louis, or 9.75c. New York, has been bid and accepted on July prime Western, with June sales at 9.37½c., St. Louis, or 9.62½c. New York. The quotation for spot and nearby is a shade lower at 9.37½c., St. Louis, or 9.62½c. New York. Some quote 9.25c. St. Louis, for June-July shipment, or 9.50c. New York. Not much activity is looked for until the Government's needs are definitely known.

Antimony.—The market is quiet, with demand about normal. The situation is easier, if anything, with near-

by Chinese and Japanese grades quoted at 24c. to 25c., New York, duty paid.

Aluminum.—The situation is unchanged at 59c. to 61c. for No. 1 virgin metal, 98 to 99 per cent pure.

Old Metals.—The market is quiet. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible.....	31.00 to 31.50
Copper, heavy and wire.....	29.50 to 30.00
Copper, light and bottoms.....	27.50 to 28.00
Brass, heavy.....	20.75 to 21.25
Brass, light.....	15.75 to 16.25
Heavy machine composition.....	27.00 to 27.25
No. 1 yellow rod brass turnings.....	19.50
No. 1 red brass or composition turnings.....	21.50 to 22.50
Lead, heavy.....	10.00
Lead, tea.....	9.25
Zinc.....	7.50

Chicago

MAY 29.—Large orders have been placed for copper and the market continues fairly active. Not much has been done in lead but the market continues strong because of the scarcity. Spelter has a little better tone. Following a good business, tin is normal. Antimony is easier and without interest. We quote as follows: Casting copper, 31c.; Lake, 32.25c.; electrolytic, 32.50c.; tin, carloads, 65.50c.; small lots, 68c. to 69c.; lead, 11.25c.; spelter, 9.37½c. to 9.50c.; sheet zinc, 19c., Oriental antimony, 27c. to 28c. On old metals we quote buying prices for less than carload lots as follows: copper wire, crucible shapes, 27c.; copper clips, 26.50c.; copper bottoms, 24.50c.; red brass, 24c.; yellow brass, 18c.; lead pipe, 8.75c.; zinc, 6.50c.; pewter, 10c. 1, 35c.; tinfoil, 42.50c.; block tin, 47.50c.

St. Louis

MAY 28.—Metals continued firm during the week with the close to-day in carload lots very firm for lead at 10.87½c. to 11c.; spelter, 9.25c. to 9.50c. In less than carload lots the closing figures were: Lead, 11.50c.; spelter, 10.50c.; tin, 70c.; lake copper, 34c.; electrolytic copper, 33.50c.; Asiatic antimony, 30c. In the Joplin district, zinc blende firmed up on the lower grades and narrowed the basis range for 60 per cent metal to \$75 to \$82.50 per ton, the last-named being the price for the choicest premium ores. The average for the week for the district was held closely to \$80 per ton. Calamine was stronger with blende and ranged from \$40 to \$45 per ton basis of 40 per cent metal. The average for the week was about \$42 per ton for the district. Lead ore was very firm and was held stiffly at \$120 for all grades, with some lots reported as being sold higher. The average for the district was \$120 per ton, showing the strength of the demand and the firmness of second grades. On miscellaneous scrap metals, we quote dealers' buying prices as follows: Light brass, 12c.; heavy yellow brass, 13c.; heavy red brass and light copper, 19c.; heavy copper and copper wire, 22.50c.; lead, 6.50c.; zinc, 6.50c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 36c.

Record Chromic Iron Ore Imports

Imports of chromic iron ore into the United States in 1916 were the largest ever recorded, according to J. S. Diller of the U. S. Geological Survey: 114,655 gross tons, against 76,455 tons in 1915, and 49,772 tons in 1913. New Caledonia furnished 33,936 tons of the 1916 imports, and Rhodesia 61,850 tons. The amount of such ore produced and sold in the United States in 1916 was far in excess of the total for the three years previous. At least 40,000 gross tons were produced, against 3281 tons in 1915, and 255 and 591 tons in 1913 and 1914 respectively.

Wage Conference Called

YOUNGSTOWN, May 28—Announcement was made by manufacturers here Monday, that the annual wage conference between the representatives of the Independent Sheet and Tinplate Manufacturers' Association and conferees of the Amalgamated Association of Iron, Steel and Tin Workers will be held at Atlantic City, beginning June 18. The bar iron conference will follow, beginning June 25. Wage scales for all manufacturing concerns governed by the Amalgamated wage contracts will be fixed in the conferences.

IRON AND INDUSTRIAL STOCKS

Steel Common Establishes New High Record in Very Exciting Week

NEW YORK, May 29, 1917.

Steel common held the center of the stage last week and there was great activity under its leadership in the stock market. About 7,000,000 shares were traded in, to which Steel common contributed 1,765,850. Last Thursday Steel common struck the highest point in its history, 131½, surpassing its former record made last November by 1¼ points. This did not end the upward trend, however, for it closed the week at 134¼, a gain for the week of 11¼ points, while Steel preferred closed at 119¼, a gain of 1¼ for the week. Since 129¼ was touched about six months ago, the price of Steel common has been down as low as 99. It was first traded in on the curb market March 26, 1901, when the price was 38. Within a few days it was admitted to the Stock Exchange and advanced rapidly to 55, but before the end of the year sagged to 24. The decline continued until it touched 8¼ in 1904. The high record of 55 made so early in its career stood until 1908, when, following the panic of 1907, business had improved. The high point of 1909 was 94¼, which was the record until last fall, when on September 9 the stock went above par for the first time in its history. Great activity continued in Steel common, but last February, after the announcement by Germany of its unrestricted submarine warfare, the stock fell below par. Slowly at first and more rapidly later, the stock advanced to the high point of last week.

Steel was not the only stock that moved upward last week, as some of the other gains were as follows: American Car & Foundry, 6 points; Bethlehem Steel, 8½; General Electric, 3%; Lackawanna Steel, 6%; Midvale Steel, 4½; National Enameling & Stamping, 5½; Pressed Steel Car, 4½; Republic Iron & Steel, 8%; Sloss-Sheffield Steel & Iron, 9.

Opinions differ as to the exact causes for the sudden increase in activity last week, but it is evident that Wall Street has been impressed by the evidences that great activity will continue in the industrial world for an indefinite time and that the Senate will not approve excessive taxes on manufacturing industries proposed by the House.

The range of prices on active iron and industrial stocks from Wednesday of last week to Monday of this week was as follows:

Allis-Chal., com., 26 - 31½	Int. Har. Corp., com., 74 - 75
Allis-Chal., pref., 84 - 86	Lacka. Steel, 95½ - 98½
Am. Can., com., 46½ - 53	Lake Sup. Corp., 20 - 21½
Am. Can., pref., 105 - 108½	Lima Loco., 55 - 56½
Am. Car & Fdy., com., 70½ - 75¼	Lukens, Com., 40½ - 41
Am. Car & Fdy., pref., 116 - 118½	Midvale Steel, 62¼ - 64¾
Am. Loco., com., 69¾ - 74¾	Nat.-Acme, 31 - 32¼
Am. Loco., pref., 102½ - 103¼	Nat. En. & Stm., com., 35¼ - 39½
Am. Rad., com., 234	Nat. En. & Stm., pref., 97 - 97¾
Am. Ship., com., 75 - 77	N. Y. Air Brake, 148 - 154
Am. Steel Fdries, 65 - 69½	Nova Scotia Stl., 92 - 95
Bald. Loco., com., 59 - 64½	Pitts. Steel, pref., 99 - 99½
Bald. Loco., pref., 100¼ - 100¾	Pressed Steel, com., 75 - 78
Beth. Steel, com., 138 - 143½	Pressed Steel, pref., 102
Beth. Steel, class B, 130½ - 137½	Ry. Steel Spring, com., 52½ - 54½
Cambria Steel, 125 - 140	Ry. Steel Spring, pref., 99¼ - 100¾
Carbon Stl., com., 95 - 106	Republic, com., 85¼ - 93¾
Central Fdry., com., 25½ - 27	Republic, pref., 104 - 105¾
Chic. Pneu. Tool, 68 - 69½	Sloss, com., 55 - 64½
Colo. Fuel, 52½ - 55½	Superior Steel, 45¼ - 48¼
Cruc. Steel, com., 70¾ - 81	Superior Steel, 1st pref., 100½
Deere & Co., pref., 93 - 98¾	Transue-Williams, 44 - 48
Driggs-Seabury, 72	Un. Alloy Steel, 44½ - 47
Gen. Electric, 159 - 164½	U. S. Pipe, com., 21½ - 23½
Gt. No. Ore Cert., 34 - 36	U. S. Pipe, pref., 58
Gulf States Steel, 124 - 131½	U. S. Steel, com., 126½ - 135
Gulf S. Steel, 1st pref., 107½ - 108	U. S. Steel, pref., 118 - 119¾
Int. Har. of N. J., com., 113 - 114	Va. I. C. & Coke, 67½ - 70
Int. Har. of N. J., pref., 114	Westing. Elec., 52 - 56

Westinghouse Electric Annual Report

The Westinghouse Electric & Mfg. Company, East Pittsburgh, sent out on Monday, May 28, its annual report for the year ending March 31, 1917. Guy E. Tripp, chairman, states that the gross earnings and net in-

come for the year were greatly in excess of any previous year in the history of the company.

The completion of large orders for munitions contributed largely to the results for the year, although sales billed and net income for the regular products of the company show large increases over any preceding year. The amount of taxes—federal, state and county—paid or accrued during the year is in excess of \$2,000,000. Owing to a strike of the employees the main works of the company at East Pittsburgh, Pa., were closed from April 21, 1916, to May 16, 1916. The value of unfilled orders on March 31, 1917, for the regular products of the company was \$39,776,739, as compared with \$22,097,995 on the same date of last year.

The net income for the year was \$18,079,888.83, thereby increasing the surplus of \$9,246,707.03, as of March 31, 1916, to a gross surplus of \$27,326,595.86. Dividends were declared for the full year at the rate of 7 per cent per annum upon the preferred stock and upon the common stock at the rate of 6 per cent per annum for the first and second quarters and at the rate of 7 per cent per annum for the third and fourth quarters. For the purpose of increasing the reserve account, the sum of \$5,000,000 has been appropriated from surplus. The net surplus as of March 31, 1917, is \$18,105,298.66, as compared with \$9,246,707.03 on March 31, 1916.

The report does not include the operations of the Westinghouse Machine Company nor are the assets and liabilities of that company included in the balance sheet.

By the acquisition during the year of additional shares of the capital stock of the Westinghouse Machine Company, the company now owns more than 98 per cent of the outstanding share capital of that company. A plan for the merger of the Westinghouse Machine Company with the Westinghouse Electric & Mfg. Company is now under consideration.

In the manufacture of Russian rifles for the British Government the New England Westinghouse Company encountered serious delays and difficulties, through various causes, most of them beyond its control or responsibility. In October, 1916, the Anglo-Russian Commission located in New York recognized the company's claim for extensions of the original dates of delivery and approved an arrangement based on the new dates proposed by the company. Early in the present year, however, the New England Company was advised that this arrangement could not be consummated and that a new arrangement was desired. As the result of further negotiations, a modified agreement has now been made under which the initial order has been reduced to 1,000,000 rifles at an increased price per rifle and the time of delivery materially extended. The British Government is, however, given an option to increase the number of rifles to the original number, viz., 1,800,000, in which case the original price is to be reinstated. The new contract also provides that the British Government shares equally with the New England Company in all profits and also guarantees against any loss exceeding \$5,000,000 in any contingency whatever under this contract.

With the exception of the contracts with the British Government for the manufacture of Russian military rifles, which are being carried out by the New England Westinghouse Company under a modified contract, the company has no uncompleted munitions contracts for foreign governments on its books, all such contracts having been completed or canceled.

Industrial Finances

Reports that the Wheeling Steel & Iron Company, Wheeling, W. Va., would probably increase the rate of dividend on its common stock are officially denied. While the board has taken no action, the next dividend on the common stock will be on the basis of 2 per cent for the quarter, or 8 per cent for the year.

Dividends

The American Locomotive Company, quarterly, 1¼ per cent on the common, payable July 2, and 1¼ per cent on the preferred, payable July 21.

The Baldwin Locomotive Works, 2½ per cent on the preferred, payable July 1.

The Harbison-Walker Refractories Company, quarterly, 1¼ per cent on the preferred, payable July 26.

Washington Officials Discuss Conditions

Cabinet and War Committee Members Address a Business Press Meeting—Pooling Deliveries of Coal, Limiting Exports and Marshaling Industry for Harvesting

CONSIDER an audience before which appeared in succession members of the cabinet of the President of the United States and others close to war activities in Washington, and one has in a word a statement of an important meeting held at the Capital on Friday, May 25. The audience was made up of editors of the business and technical press of the country, who had determined to secure active, personal and specific support from the Administration in an effort "to promote the more effective use of the business energies of the country by a closer co-operation of the business press with the Government." Washington acquiesced in the idea, and the arrangements, made only a week previously by a committee of editors, which met with little, if any, hesitation in official circles, brought together a large group of the editorial representatives of some 118 journals which reach perhaps as many as four or five million readers.

The food question and the mobilizing of industrial workers in the harvest periods; the supply of coal and other fuels, having to do in part with the pooling methods resorted to in the emergency to get deliveries; legislation needed for limiting exports and to prevent trading with the enemy; an emergency ruling to allow immigration, illiterate and under labor-contracts; some likely commandeering of ships; the activity in business which will continue, and the condition which must be observed to float the Liberty Loan bonds were among the subjects discussed. It followed naturally that allusions to the length of the war were many—put usually at fully two years, particularly in the preparation plans—and the addresses frequently reached lofty patriotic levels which opened up fresh views of the underlying causes of the war and the impelling needs of carrying it on to a decisive conclusion.

Mobilizing for Short-Term Harvesting Service

The need of arranging for putting into the grain fields at the time of harvest large numbers of industrial workers was touched on by Dr. F. H. Pearson, president Iowa State College, who represented in the conference Secretary Houston of Agriculture, and by Secretary of Labor William B. Wilson. The floating supply of labor ordinarily obtained through advertisements in post offices and the like, Secretary Wilson explained, will not be available, but he pointed out that there should be no difficulty in securing the active support of the workers themselves, as they look upon this special temporary employment in the nature of a holiday. They are not, he said, concerned over the amount paid for the work, as they are aware of the fact that employment is open to them in the factory from which they came when the garnering at the peak load time is completed. Meanwhile the factories may utilize this period for annual repairs, as used to be the case in earlier times when a floating labor supply was negligible.

To meet the demands for labor in the South, but particularly in the Southwest, Mr. Wilson explained that within three days he had issued a permit to allow aliens to come from Mexico into the United States notwithstanding the prohibition against importing contract labor and in spite of the literacy provision now a law, the stipulation being, however, that the alien must continue in agricultural pursuits only and must emigrate when ordered to by the Department of Labor. He explained that Chinese labor could not be admitted by overruling the stipulation regarding general immigration, as the Chinese exclusion act is a separate measure.

Pooling Coal Shipments

Francis S. Peabody, chairman of the committee on coal production, Council of National Defense, told of the success in pooling railroad coal shipments. By this a

steamer on the Lakes waiting for coal could take from any and all of the cars. The result is that the cars do not wait in groups for different ships depending on the shipper of the coal, but instead a ship is held a minimum time and the cars are emptied practically immediately after they reach the ship terminal. The cars are thus utilized at high efficiency, as they may bring back iron ore handled under the same pooling system so far as the boats and cars are concerned.

He mentioned the expectation of an early conference of shippers and receivers of coal along the Atlantic Coast to pool the floating equipment and the cars involved. As a result it is expected that the shipment of coal to New England will be increased by 5,000,000 tons and by pooling for the movement of coal and ore in the Northwest an increase in shipments of 3,000,000 tons has been obtained.

He mentioned incidentally that the minutes of these pool-arranging conferences are public and he inferred that the system may work out so well and prove to be of so much value economically that after-war legislation may be demanded to allow such practices. So far no particular industry has been singled out for special attention in the matter of the receipts of coal, but instead the delivery on the order of priority is: first to the Government; second to munitions plants; third to railroads on coal lines, and fourth to other railroad lines.

He was emphatic that the present situation is largely a matter of a panic without a good basis, as the amount of coal being produced is greater than ever before. The point is that every one wants coal at the same time and besides consumers in the United States demands come from Brazil, Argentina, Italy, France and Canada, while such a large source of supply as Nova Scotia is nearly negligible owing to the labor shortage.

Incidentally it may be stated that Mr. Peabody was desirous particularly of passing on his view that there is no red tape in the handling of business in Washington and that a tremendous amount of work had been done in the last forty days by the National Council of Defense, on which a résumé, he said, was about to be presented to Congress. In his first week of activity five strikes had been settled representing 12,000 tons daily coal production and in one week the output in the Pittsburgh district has been brought to 70 per cent against 50.1 per cent the week preceding and, for example, in Franklin County, Illinois, in one week the production had been increased from 55.05 to 72 per cent.

The address by Dr. Pearson, in addition to emphasizing the desirability of marshaling industrial workers to help in the grain fields at the harvest time, touched on the food question and the necessity of minimizing waste. He pointed out that household wastes amount to 2c. per person per day, or a total of \$700,000,000 per annum. In pointing out the 31 per cent less acreage of wheat this year as compared with last year and the poor condition, 73 per cent against 84 per cent a year ago, he dealt on the need of utilizing more of the king crop of the country, namely, corn, of which so far only 10 per cent has gone into food products.

Act to Limit Exports

Besides Secretary Wilson, the other Cabinet officers who addressed the meeting were William C. Redfield, Secretary of Commerce; Josephus Daniels, Secretary of the Navy; Newton B. Baker, Secretary of War, and Franklin K. Lane, Secretary of the Interior. Secretary Redfield told of two acts that were to be considered by Congress—one an act to limit exports and the other, introduced into the House on the day of the meeting, on trading with the enemy. Nothing extreme is planned

under the act to limit exports, he said, nor is the intent to establish embargoes but to cover such a contingency as the following known to have existed for some time. Coal shipments have been going from Norfolk to South America to a company known to be a friendly branch of a large German coal concern, which in turn has been supplying the coal to German raiders. Under the new act it would be necessary for the company shipping from this country to get a license.

He touched on the demand for tin cans and paid a tribute to the makers and distributors who had helped to solve the problem. He mentioned how plans had been made to supply 50,000,000 in July and 12,000,000 cans per month for the remainder of the year for pork and beans for the army of the Allies, 122,000,000 cans in all. Under the act it will be possible to limit exports of tin plate for 60 days, say, to the Orient where the demand is not for perishable products, and thus allow the industry to catch up. He told how the act will provide a means for controlling the export, for example, of ferromanganese. A few days ago it seems that 30 tons were about to leave the country for Norway, but the shipment was voluntarily withdrawn, he said, without the slightest resistance when the facts as to needs here were explained.

Mr. Redfield also told at length what had been done by the Bureau of Standards in developing in the two and a half years of the war a quality of optical glass that was good as the best of any of the German-made glass on which every navy of the world had been dependent. The other contributions of the Bureau of Standards had been the development of a chemical porcelain, and he mentioned also the discovery of securing potash from seaweed and, of course, had something to say on the development of dyestuffs. His contributions to the food question have been the successful publicity given to a considerable number of food fish which is here in large quantities and utilized all over the world except in this country. For example 2,000,000 lb. of one particular fish is used monthly, though never consumed heretofore.

Secretary Daniels claimed that about one-tenth of the owners of craft needed for the prosecution of the war were holding out for high prices and that he was seeking authority to commandeer the ships, planning to pay 75 per cent of their value in cash and to have the remainder of the amount settled in the courts.

Secretary Baker explained how suggestions had come that different classes of workers should be regarded as indispensable under the selective draft for the army, but the suggestions covered every class of work that one could think of and the exemptions will have to be by individual and not by class. He pointed out incidentally that indispensability does not as a rule exist among those below 25 or 27 years of age.

More Active Business Than Ever

What will happen to business and the conditions necessary for the floating of the Liberty Loan bonds were discussed by Frank A. Vanderlip, president National City Bank, New York. He pointed out that the estimated wealth of the country is \$250,000,000,000, but that it is not possible to buy bonds with firms, railroads or factories. He asserted that the fight is to be made on the savings of the future and that the loan is going to be placed on an expansion of credit. One must borrow against the bonds according to his financial ability to pay. There will be an expansion of bank credits, he said, about equal to the total of amount of the loan. He pointed out that this country has a greater difficulty in floating this loan in one way than England had. In the case of England there were \$1,500,000,000 of bills in her favor as well as a good many securities which could be sold to America, but this country has got to do its financing itself.

He dwelt on lessons of thrift which the war will teach, and in spite of the chill, which talks of economy have developed, he said that business would be more active than we have ever seen, but of course in the necessities of life. He urged that it is unpatriotic to employ labor on the unnecessary thing. He said that we are entering the most intense industrial activity this country has ever known and a period of the highest wage scales. The dislocation of industry and the dis-

organization of commerce will bring about some worry, but there will be no unemployment, but two jobs for the one candidate.

He hardly acquiesced in an attitude that the Government can buy below the market, and then raise money by taxing all the profits of a company, if there are any, and following this by getting the people to subscribe to bonds. He was willing that the burden should be put on this generation, but urged that it is not wise to lay a tax on business that is discouraging and one that should not be carried at the outset of the war.

Gasoline Supply

Van H. Manning, director United States Bureau of Mines, devoted himself chiefly to the question of the supply of gasoline, to show the need of encouraging the opening of new petroleum wells and the production and movement of machinery for this need. He suggested that the production of petroleum probably reached a maximum last year, but new fields and new methods may be discovered. The present indications are that the manufacture of pleasure cars may not be continued on the scale of last year, that additional production may be obtained from the cracking process, which produced about 7½ per cent of last year's supply of gasoline; that better utilization may be made of oil sand, and that a greater recovery from natural gas may be obtained.

Frank A. Scott, chairman munitions board, Council of National Defense, in his address said there was not a great deal for one engaged in the production of war material to say in public. "Modern war," he said, "does not go far outside of four factors—men, metal, machinery and money. The munitions board entirely takes care of two of these—metal and machinery." It is very hard, he added, to appreciate the size of the task that falls upon the instrumentalities charged with furnishing a modern army with its equipment. At Gettysburg in three days' fighting 32,726 rounds of ammunition were fired. Now the same number of guns to-day, 310, fire that ammunition easily in about seven minutes. A shrapnel body without the fuse on it requires 53 machine tool operations, and shrapnel is fired at the rate of 20 to 26 a minute. We may have eventually an even more centralized form of control for our purchasing and manufacture.

We use the ordinary Springfield rifle. It is the best rifle in the world. It has the highest muzzle velocity and thus the longest range and the flattest trajectory. We have not enough Springfields. We have adopted the Enfield rifle, for the manufacture of which there are a number of factories in the country. This rifle is to be manufactured now to use our ammunition, so that the cartridges will be interchangeable.

To Build 30 Cities Before Sept. 1

The greatest problem we have, he continued, is the creation of cantonments for 1,000,000. We will have to build virtually thirty cities to house 30,000 men each and provide the sewerage, water, heat, light, and other systems. These will have to be completed by Sept. 1. If accomplished the feat will be one of the marvels of the age. Contracts are to be let solely to the "hurry-up" kind of contractors. We have one million of the most resourceful people in the world. There should be no question of any kind as to the outcome of this war if we put ourselves in it.

The Chesapeake Iron Works, Westport, Md., will soon begin the manufacture of electric traveling cranes. The announcement has just been made of the plans. The first unit will be a building 60 x 120 ft. Plans for the new work by the company were made through F. S. Chavannes, president of the company, and the Civic and Industrial Bureau of the Merchants and Manufacturers' Association, Baltimore. The new crane department will be under the charge of A. E. Hogrebe, who for 18 years was chief engineer of the crane department of the Niles-Bement-Pond Company, Philadelphia.

The Carrwald Mfg. Company has been incorporated in Philadelphia, with a capital stock of \$5,000, to manufacture machinery and power-transmitting devices, motor-propelled vehicles, auto locks, and similar accessories.

One Commission to Buy All War Supplies

What Is Involved in the Pending Proposal —Questionable "Savings" by Taking Makers' Profits on Government Business

WASHINGTON, May 29, 1917.—The project to create, by means of an international agreement, a purchasing commission to buy war supplies for the Allies and for the United States, has been so broadened in scope that it will require far more comprehensive legislation to put it into force than has heretofore been contemplated. The agreement will possess almost the formality of a treaty and, as it will be attested by the signatures of the Secretary of State and of the ambassadors at Washington of all the Allied nations, it may be held that it will require ratification by the Senate and by the chancelleries of the signatory governments. In any event, it is believed that an act of Congress will be required to clothe the commission with the desired authority to concentrate in a single jurisdiction functions now exercised by half a score of executive departments and independent bureaus. Under these circumstances the prediction heretofore made that the commission will probably be in active operation soon after July 1 may require revision.

In Favor of Concentrated Buying

The general proposition that the buying of war supplies for all the countries involved in the present conflict be concentrated in a single commission has been quite favorably received by manufacturers as well as by the heads of the numerous departments and bureaus of this Government heretofore engaged in purchasing material to fit out the army and navy. The project is strongly indorsed by the Council of National Defense and by the General Munitions Board, which bodies have had ample opportunity since the declaration of war with Germany to learn from close touch with the subject the absolute lack of organization and co-ordination that has heretofore existed in the most important purchasing bureaus.

The manufacturers who have expressed opinions on the subject appear to welcome the opportunity to deal with a single agency of unlimited authority and which presumably would be willing to adopt a single broad policy of fair treatment of the contractor as a condition of fair dealing toward the Government. At the present time the various purchasing agencies have policies of their own which vary greatly, certain officials sharing the view of the Secretary of the Navy that it is the right of the Government not only to secure material at lower prices than it can be purchased for by private individuals, but that it is the patriotic duty of every manufacturer or dealer to pocket a substantial loss for the honor and credit of doing business with the Government. Other purchasing officers take a more reasonable view; but it is obvious that the entire subject of Government buying is greatly in need of standardization, and it is hoped that the vesting of the purchasing power in a single commission, probably dominated by an individual of broad experience, will result in the establishment of mutually satisfactory relations between the Government and contractors in all lines.

Inspection Systems to Be Kept

It is now understood that the parties to the proposed international agreement will include England, France, Belgium, Italy, Japan and the United States, and that practically every dollar spent for war material by any of these countries will be disbursed by the commission. Certain officials of the War and Navy Departments have accepted rather reluctantly the idea of surrendering to the commission the purchase of all materials, especially ordnance supplies, which heretofore have been bought after much personal negotiation between experts of the Ordnance Bureaus and representatives of the manufacturers. It is now understood,

however, that the creation of the commission will in no way interfere with the elaborate systems of inspection of material now maintained, which include the stationing of a large staff of inspectors at the principal plants making war material for the Government. It is also understood that the commission will not attempt the preparation of detail specifications for the purchase of technical material, although an effort will be made to induce the bureaus to standardize such specifications and especially to bring those of the War and Navy departments into greater harmony than now exists. A very important consideration in this connection is the fact that if the commission proves to be a success it is highly probable that after the war it will be continued as a purchasing agency for all the departments of the Government, although, of course, it will cease to serve foreign nations. This probability makes it essential that the commission should be organized on a basis satisfactory alike to the producers of the country and the Government, and if this is accomplished great benefits may result to both.

Driving Hard Bargains with Manufacturers

It is natural that the manufacturers of all kinds of war material which, in view of the scope of the operations of the United States and its allies, includes about everything that is made, should feel a very lively interest in the question of the policy of the commission with respect to the profits to be allowed producers. Administration officials disclaim any intention of driving hard bargains for supplies, but thus far there has been no assurance that a reasonable commercial profit would be considered. One statement credited to the Treasury Department, by which the agreement is being prepared, speaks of a "living profit," whatever that may mean. Some uneasiness has been aroused as the result of the recent publication in official bulletins of statements to the effect that the Committee on Supplies of the Advisory Commission "has secured options for the Government on large supplies of leather at prices in effect at the beginning of the war," and is planning to purchase, "through an extensive system of co-operative committees" large quantities of cotton, wool, shoes, knit goods, mattresses, etc., and the Subcommittee on Lumber has secured a sufficient quantity of that commodity for the construction of the new army cantonments at rates "averaging from \$3 to \$5 a thousand below the prevailing market price in the several sections from which it will be taken." It is further stated that by means of improved specifications, a carefully worked out disposition of supply sources and railroad facilities the committee has "already saved the Government at least \$5,000,000, entirely aside from the saving from price agreements." The announcements of these subcommittees indicate that leather and lumber, at least, are being purchased at prices which represent little if any profit to the producers and which certainly are far below the current market.

Government Cannot Eat and Keep Its Cake

In this connection a statement made by President Frank A. Vanderlip of the National City Bank of New York, at the conference of editors of business papers held here on May 25, is the subject of much approving comment by representatives of manufacturers who have been called to Washington to confer with officials concerning Government contracts. Mr. Vanderlip said that "there has been an idea, now apparently dissipated, that the Government can spend the same money three times—by buying below the market price, by taxing profits and by subscriptions to bonds; but this cannot be done." It is obvious that if manufacturers are compelled to give their chief attention to the production of

material for the Government practically without profit, they will have neither taxable gains nor surplus to invest in war bonds. The hope is expressed that Mr. Vanderlip is correct in his impression that the idea that the Government can safely compel manufacturers to sell their products at cost has been "dissipated."

The report that Bernard Baruch is to be the chair-

man of the projected purchasing commission is not confirmed. Mr. Baruch has done excellent work for the Government in the purchase of certain raw materials, notably copper, and as it is believed his appointment at the head of the commission would be favored by the Secretary of the Treasury, it is quite possible he may be chosen.

W. L. C.

War-Stimulated Industries Heavily Taxed

The British Plan Favored—Large Purchases of Rifles and Motor Trucks — The Tariff Additions

WASHINGTON, May 29, 1917.—Revenue legislation has been vigorously pushed during the past week. The House of Representatives, after two weeks of debate, limited strictly to the revenue problem, has passed the Kitchin bill with few changes and sent it to the Senate. The Finance Committee, after five days devoted to hearing representatives of various interests affected by the proposed legislation, has taken the House measure up in executive session and has made such progress that Chairman Simmons is now planning to report the measure within a few days. While the deliberations of the committee have been closely guarded from the public, it can be stated authoritatively that the bill is being radically revised along conservative lines and there is reason to believe that the Senate leaders in urging the measure upon their colleagues will not be obliged to repeat Mr. Kitchin's appeal to "swallow it whole with eyes shut."

British Excess Profits Tax Favored

The impression is strong in the Senate Finance Committee, as the result of careful investigation, that the British system of levying excess profits taxes is more desirable than that authorized by our existing law and perpetuated in the pending bill. Favorable consideration is therefore being given to a new method for computing this tax based upon the difference between the profits realized during the war as compared with the average annual profits for three years prior to July 1, 1914. In order that this levy shall not impose too heavy a burden upon certain lines of industry, which have been largely developed as the result of the war, it has been suggested that an exemption be provided of a certain percentage of profit somewhat less than the 8 per cent now allowed. It is conceded that this basis of assessing the excess profits tax would turn into the Federal Treasury a much larger proportion of strictly war profits than the system now in use, but it is urged that such a tax would rest more lightly on the general industries of the country which have not been specially stimulated by war conditions.

In line with the general plan of revising the House bill, which the Senate committee is pursuing, the proposed tax of 5 per cent on the gross receipts of automobile manufacturers has been tentatively stricken out and in its place there has been adopted a federal tax on automobile owners, ranging from \$1 to \$10, according to the value of the car. On the basis of these figures automobiles would return \$15,000,000 or \$20,000,000 per annum as compared with \$60,000,000, the estimated revenue under the House provision. It is pointed out, however, by members of the committee that it will be practicable to secure any required amount of revenue from this source by the simple expedient of raising the schedule of rates. It is argued in favor of this change that the tax imposed would be scattered over several million car owners instead of being collected from a comparatively small number of manufacturers, and that the Senate plan would in no way affect the prosperity of the industry, while the House project would undoubtedly drive many weak concerns to the wall.

The 10 Per Cent Tariff Addition

An interesting development of the discussion by the Senate committee of the House bill is the first official

appearance of the recently appointed Tariff Commission in connection with revenue legislation. Professor Taussig, the chairman of the commission, has been called into conference and has been invited to make a study of the provision of the bill imposing a customs tax of 10 per cent ad valorem on all imported merchandise and to make recommendations as to the advisability of making tariff changes of any kind. It is understood that Professor Taussig has criticized the House tariff provision as unscientific and calculated to affect adversely many important industries. At the committee's suggestion he is preparing a series of amendments expanding greatly the exemptions to the war tariff tax incorporated in the House on Chairman Kitchin's motion.

For Tungsten Ore Tariff

The producers of tungsten ore in Boulder County, Colorado, have appealed to the Senate committee to retain in the revenue bill the 10 per cent ad valorem duty incorporated by the House. In a memorial addressed to the committee, A. P. Ardourel, representing the tungsten ore miners, says:

We are glad to see a tariff of some kind placed on tungsten ore and believe that the burden will rest very lightly. Before the cheap ores were coming in from Peru, Bolivia and Japan, we received as high as \$105 a unit for tungsten ores, 20 lb. of 60 per cent material being a unit. At the present time we are receiving \$17 a unit for the same material. Tungsten ore is principally derived from Bolivia from which we receive about 600,000 lb. per month, making 18,000 units. We are told by those who control most of our mines in Boulder County and who are buying this cheap product from Bolivia, that the cost to them is \$8 per unit laid down in New York City. It is true they are paying us \$17 a unit but they are continually reminding us of the fact that they can get it for \$8 and by paying a little more to the miners of Bolivia they will be able to produce a sufficient quantity to supply the demand of high grade tungsten for tool steel in the United States. We would like to see a much higher tariff placed on the crude ore than the rate provided in this bill.

It is perhaps quite a relief to you to have some persons come here and say that they are in favor of what you are trying to do, namely, raise revenue for the Government. As representing the humble tungsten miners of Boulder County, Colorado, I want to say that we are very much in favor of this tariff and only hope that in the very near future you will have an opportunity of increasing it many times.

Representations have been made to the Finance Committee concerning the impropriety of imposing a tax on pig tin, as provided by the House bill. Thus far, however, the Department of Commerce, which is supervising the work of the special committee on tin plate appointed some weeks ago to control the output of tin cans, has not taken the matter up with Chairman Simmons. It is understood that the Tariff Commission is giving attention to the subject and will refer to it in the recommendations soon to be filed.

To Buy 1,000,000 Rifles

The War Department is about to let contracts for approximately 1,000,000 army rifles, chiefly Enfields, at a cost of about \$25,000,000. It is understood that the Midvale Steel & Ordnance Company will secure about one-half this order and will manufacture the rifles in its plant at Eddystone. The Winchester Arms Company and the Remington Company will divide the remainder

of the contract. All these concerns have the necessary special equipment for the manufacture of the Enfield rifle, which is to be rechambered so as to use American ammunition. While these rifles are to be purchased on a cost plus profit basis the exact amount of the profit has not yet been fixed.

It should be understood in this connection that the War Department has not abandoned the Springfield rifle as the leading type to be used by the United States Army. The manufacture of this rifle will be continued at the arsenals, which are fully equipped with gages, jigs, automatics, etc., for its production, but the necessity of supplying in a very short time a large number of rifles to equip the army to be sent to Europe, has compelled the use of the Enfield rifle, which the Government cannot make with the present equipment of the arsenals but which can be turned out in large numbers by several concerns heretofore working on foreign orders.

Army Motor Trucks

According to an official announcement by the War Department, the new American army will be supplied with motor trucks as rapidly as they are needed through the development of the Government's present plans. Bids have already been asked on 35,000 trucks of light and heavy types, known officially as class A and class B, and present estimates indicate that they can be secured from the existing manufacturing plants as fast as they are required. The War Department has no present expectation that it will have to resort to commandeering private machines in commercial service. The new army trucks will be of a construction which would handle in commercial service loads of approximately 3 to 5 tons, respectively. The bids will be opened in Chicago on June 10. Arrangements are also being made to secure the necessary drivers. The specifications for these new trucks were formulated by the War Department Motor Transport Board, of which Col. Chauncey B. Baker is the head, in conjunction with several divisions of the standards committee of the Society of Automotive Engineers, after an exhaustive study of European and American field experience. In a statement concerning the purchase of trucks Colonel Baker says:

Fortunately for the country in the existing emergency, the prevailing types of American commercial trucks have proved fairly adequate to the field work in France, where superior roads and short hauls make conditions much more favorable for truck operations than conditions in this country. There are many firms which have been engaged in making these trucks for the allies on a large scale, and this gives assurance that the American factories will be capable of turning out military trucks which will be thoroughly practical for the forces which we send abroad, even if their design is not in every way identical with the present specifications. It will be necessary for truck manufacturers to meet the major details of these specifications, and a board of duly constituted experts will pass on the designs of the makes which are offered. It is absolutely essential that the greatest possible uniformity be obtained in the companies of trucks which will be formed for military service so that only in case of the most dire necessity would existing fleets of commercial trucks, now in service, be commandeered for military use. The collecting of such companies of trucks would entail the use of many different kinds of trucks in the same unit and this would create tremendous confusion. The department will, therefore, proceed under the policy of putting into service, for the present, only fleets of new trucks made especially for military duty. While the standard commercial types which American firms are now prepared to manufacture are thus usable, it is expected that motor-truck makers will exert every effort to approximate the new military specifications as rapidly as their facilities can be modified to meet them.

The premature explosion of shells on the armed liners St. Louis, St. Paul and Mongolia which, in the case of the last named ship, resulted in the death of two nurses, has induced Senator Frelinghuysen of New Jersey to present in the Senate a resolution calling for the appointment of a special committee of five Senators "to make careful inquiry into the causes of the recent accident on shipboard due to defective ammunition or otherwise." In anticipation of action by Congress and in the regular official routine, the Navy Department has already made a careful inquiry as to the cause of the premature explosions, and has reached the conclusion that many of the 6-in. shells made prior to

1900 cannot be relied upon for proper performance under present service conditions and orders have, therefore, been issued withdrawing them from both naval and merchant ships. Rear Admiral Earl, chief of the Naval Bureau of Ordnance, in a preliminary report on this investigation says:

The development of modern ordnance has been extremely rapid, and the comparative freedom of our navy from serious accidents in connection therewith has been a source of satisfaction to the service, but mishaps with ordnance material cannot be absolutely prevented. It is necessary, in all work on explosives, to draw deductions from the actual tests made at the proving ground. However, it must be borne in mind that material used as an explosive is designed to spend all of its force in an instant space of time, and cannot be relied upon with absolute certainty to give the same result in all cases.

The conclusion reached is that all 6-in. shells and fuses manufactured since the year 1900 are satisfactory, and that the premature bursts, so unfortunately occurring on our armed liners, may be attributed to shells made prior to 1900, and made possibly with slightly thinner walls than the latest type of shells. On the return of the St. Louis from her first trip, about April 9, 1917, all such shells were removed, and no such shells are afloat now on armed liners. This procedure was also adopted at once in the case of all 6-in. ammunition for vessels of the navy. Prior to this happening the Bureau of Ordnance had every reason to expect that every shell in its magazine of 6-in. caliber was a satisfactory shell.

Pooling Coal Shipments

Plans are rapidly being perfected for pooling coal shipments with a view to expediting transportation and conserving car service. The arrangement for pooling shipments to the Northwest through the Great Lake ports, tentatively agreed upon at a recent meeting here of coal operators and shippers, has been finally approved by F. S. Peabody, chairman of the committee on coal production of the Council of National Defense, and will go into effect on June 1. This plan has also been definitely approved at a joint meeting of Lake coal shippers and railroad representatives held at Cleveland on May 22. Mr. Peabody estimates that the plan will increase capacity of lake shipping to deliver coal to the vitally important industries of the Northwest by about two and a half million tons during the present shipping season.

A meeting of the coal shippers and receivers of the Atlantic tidewater region will be held on May 31 to effect, if possible, a similar pooling plan for shipping coal from tidewater ports to the ports of New England. About 20,000,000 tons annually is handled through Atlantic ports, and as New England is both one of the most important and one of the most difficult sections to supply under existing conditions, it is expected that the pooling system will contribute to the New England problem as great a proportional increase in capacity as it is expected to secure in the Great Lakes region.

After deliberations extending over several weeks the Cabinet has approved a bill drafted by the Department of Justice clothing the President with power to regulate shipments by common carrier and generally to direct the commerce of the country, giving preference or priority to particular kinds of traffic. This measure, which is by far the most comprehensive bestowal of authority upon the Executive that has been suggested as a war measure, was introduced in the Senate May 25 by Senator Newlands, referred to the Committee on Interstate Commerce, and immediately reported back with a recommendation for its early passage. W. L. C.

The American Steel Export Company, New York, has issued an attractively arranged and illustrated booklet, descriptive of the complete export engineering service which its export engineering and contracting department is prepared to render. The American Steel Export Company is embarked upon an aggressive campaign to secure business in the mechanical upbuilding of undeveloped countries on which England, France and Germany have had a fast hold up to the outbreak of the war, including power generating equipment, equipment for making bolts, nuts, cans, castings, nails, pipe and other metal working plants, and the products of such equipment.

Pittsburgh and Nearby Districts

At the regular monthly meeting of the Engineers Society of Western Pennsylvania, held in its new rooms, Union Arcade Building, Pittsburgh, on Tuesday evening, May 28, J. C. Hobbs, assistant to superintendent of the power stations of the Duquesne Light Company, Pittsburgh, read a paper entitled "An Efficient Gas Fired Boiler Installation."

The Meadville Malleable Iron Company, Meadville, Pa., is receiving bids on a three-story core room, 30 x 122 ft., to cost about \$35,000.

The Fallston Fire Clay Company, Oliver Building, Pittsburgh, which formerly manufactured face brick only, is now making fire brick at its Fallston and Eastvale works, both near Beaver, Pa. The company has an annual capacity of about 30,000,000 fire brick. F. P. Cuthbert is general manager.

The Ohio River Coal Company, formed by W. M. Henderson, Lewis W. Hicks and H. H. Patterson, all of Pittsburgh, has closed a 60-day option on 3000 acres of Freeport coal in Greene township, Beaver county, Pa., and engineers are making a survey. A private railroad will be built to connect the coal mines with a new railroad under construction by the Pennsylvania Railroad Company.

D. W. Kerr and associates have purchased for cash the controlling interest of the Trumbull Steel Company in the Fort Smith Spelter Company, and have reorganized the company. The officers are D. W. Kerr, president and treasurer; F. W. Stillwagon, vice-president and secretary; H. S. Buck, vice-president and general manager. These officers and Lloyd Booth, Paul Wick, W. Manning Kerr and C. W. Finney constitute the board.

The offices of the Superior Steel Company have been removed from the works at Carnegie, Pa., to the Union Arcade Building, Pittsburgh. C. H. Forrester, who was recently appointed secretary and treasurer of the Superior Steel Corporation, which is the holding company for the Superior Steel Company, was formerly connected with the American Iron & Steel Mfg. Company at Lebanon, Pa., now owned by the Bethlehem Steel Company, South Bethlehem, Pa.

The National Tube Company has leased a room at 419 Fourth Avenue, Pittsburgh, to be used as an employment bureau.

The additions under way to the seamless tube mills of the National Tube Company at Ellwood City, Pa., are going forward fairly rapidly, and are expected to be completed in the early fall. This will about double the capacity and will give the company an output of about 10,000 tons per month.

The Pittsburgh Aluminum Company, Pittsburgh, was recently incorporated with a capital stock of \$20,000. C. F. Miller is president and Wm. J. Graney, manager. The company reports it has a daily capacity of 3000 lb. of notch, bar and ingot metal.

Makers of steel conduit in the Pittsburgh district have lowered discounts 10 points, equal to an advance of \$20 per ton. On April 16 prices were advanced about \$5 per ton. New demand for steel conduit is reported heavy.

The Casey-Moorhead Engineering Company has opened offices in the Bessemer Building, Pittsburgh, as consulting electrical engineer, furnishing appraisals, estimates, reports, plans and specifications on electrical apparatus, applied to industrial plants and coal mines. Both Mr. Moorhead and Mr. Casey were formerly with the Westinghouse Electric & Mfg. Company, Pittsburgh.

The Vanadium-Alloys Steel Company, Pittsburgh, is again supplying the trade with Red Cut Cobalt in addition to Red Cut Superior high-speed steel. The former is carried in Pittsburgh and Latrobe warehouses and by Field & Co., 721 Arch Street, Philadelphia; George Nash Company, 646 Washington Boulevard, Chicago; E. T. Ward's Sons Company, 44 Farnsworth Street, Boston, and George Nash Company, 304 Hudson Street, New York.

GARDEN PLOTS FOR EMPLOYEES

Employers Give Many an Opportunity to Increase Food Supply—Labor Items

Practically all the available land about the Firestone Tire & Rubber Company's factories at Akron, Ohio, is under cultivation and more than 350 of its married employees are receiving instructions in intensive farming. H. S. Firestone, president of the company, is supervising the work personally. Seventy acres of land about the Firestone plant has been plowed up and divided into plots. Within 48 hours after the offer was made every plot had been applied for and there was a large waiting list. A time clock has been installed and each gardener must register a certain number of hours work each week or forfeit his plot. The company furnishes the seeds and an expert gardener has been employed to instruct the men and insure maximum production. It is expected that sufficient potatoes, beans, cabbages and other garden crops to supply more than 350 families will be raised.

The Columbia Steel & Shafting Company, Carnegie, Pa., has given employees 72 plots, each 50 x 50 ft., for gardens. E. L. Parker, vice-president and general manager of the company, has engaged a soil expert to direct the planting and cultivation of the plots.

Employees of the Westinghouse Electric & Mfg. Company, East Pittsburgh, and also at other plants, whose salaries amount to \$150 per month and less, have received a bonus of 10 per cent. This is in addition to a previous bonus paid by the company, which pays the employees from 8½ to 12 per cent monthly.

About 150 employees at the shipbuilding plant of John A. Mathis & Company, Coopers Point, Camden, N. J., who recently declared a strike with demand for higher wages, returned to work on May 23, with the company granting the increase asked. Under the new scale the men will receive 53 1/3 cents an hour with 48-hour week; time and a half for extra work, and double time for Saturday afternoon, Sundays and legal holidays. No settlement has been reached with the strikers at the other shipbuilding plants, including the Camden Shipbuilding Company, Quigley & Davis, and the Noecker & Ake Shipbuilding Company.

Effective May 21, the Niles Tool Works Company, Hamilton, Ohio, increased the wages of all employees 10 per cent, exclusive of the foremen and office force.

In order to encourage building to relieve shortage of houses at Gary, Ind., the United States Steel Corporation will advance money to its employees up to 75 per cent of the cost of the houses, making the loans at 6 per cent and charging no commission.

Plans are being made by the independent sheet and tinplate and bar iron manufacturers to meet in conference with the Amalgamated Association conferees at Atlantic City during the second or third week of June.

British Manganese Ore Imports

British manganese ore imports are not declining alarmingly, according to official data just published. The March, 1917, imports were 35,879 gross tons, bringing the total for the first quarter to 97,693 tons, against 87,098 tons to April 1, 1916, and 86,605 tons to April 1, 1915. It is surprising to note that the February and March imports this year are 10,659 tons in excess of those for the same two months in 1916, despite unrestricted submarine warfare this year. The monthly import rate this year so far is 32,564 tons against 36,625 tons per month for all of 1916, but only 31,060 tons per month in 1915.

The National Slag Company, Allentown, Pa., will extend its works by the installation of a new 600 ton crusher with auxiliary equipment to provide a daily capacity of from seven to eight carloads of material. The output will be used by the Bethlehem Steel Company at its Lebanon and Cornwall blast furnaces.

PERSONAL

E. T. Sproull has been made general manager of sales of the Trumbull Steel Company, Warren, Ohio, succeeding A. N. Flora, who was recently made vice-president of the company.

B. S. Stephenson, Pittsburgh representative of M. A. Hanna & Co., Cleveland, has been nominated for president of the Ohio State University Association, the national association of alumni for the year beginning June 2, 1917. He has no opposition.

O. L. Pringle has become assistant to the general manager of the Cambria Steel Company, Johnstown, Pa., a position recently held by Harry A. Whitaker, who has been made general superintendent of Worth Brothers plant of the Midvale Steel & Ordnance Company, Coatesville.

I. S. Fouse, formerly associated with the Standard Steel Car Company, Pittsburgh, works at Butler, Pa., is now general manager of the Allegheny Foundry & Machine Company, Glassmere, Pa.

Thomas D. Graham, in charge of the Pittsburgh office of the Bourne-Fuller Company, Cleveland, has been called to Fort Niagara, where he will remain for three months at the officers' training camp. Mr. Graham is a lieutenant in the officers' reserve corps.

Fred C. Baird, traffic manager of the Bessemer & Lake Erie Railroad Company, owned and operated by the Carnegie Steel Company, Pittsburgh, has been appointed commissioner to administer the pooling of coal in the Lake trade, and has assumed his duties at Cleveland. The object is to pool all the Lake coal, whereby a given shipment will not wait for its own Lake vessel, coal being simply graded and shipped by vessels as they become available. It is estimated roughly that the pooling will increase the effectiveness of the railroad rolling stock by fully 10 per cent.

Howell D. Sawyer, president International Steel Erection Company, Waukesha, Wis., has enlisted in the officers' reserve corps and is now at Fort Sheridan, Ill., to participate in the military training camp. C. J. McIntosh, president Federal Bridge & Structural Company, Waukesha, and Frank McLaughlin of the same company, have been commissioned in the quartermaster officers' reserve corps, engineering department, and expect to be called soon. Mitchell Mackie, sales manager Waukesha Motor Company, captain in the reserve corps, in charge of motor transport, has been called for duty at Fort Sam Houston, Tex.

David Evans, president Chicago Steel Casting Company and senior partner of David Evans & Co., Chicago representatives of the Sloss-Sheffield Steel & Iron Company, is serving the Government as captain of a motor truck company at Fort Sam Houston, Texas. He has charge of 33 trucks. Mr. Evans served in the Spanish-American War.

R. F. Anderson, connected with the body engineering department of the Packard Motor Car Company, Detroit, for three years, has resigned to become body engineer of the Grand Rapids-Hayes-Ionia plant.

Ward F. Herst, who was connected with the Brown-Lipe Company at Syracuse, N. Y., has been appointed manager of the M. & S. Corporation, Detroit, manufacturer of gears.

D. H. Thomson has been elected president and treasurer of the Terry Steam Turbine Company, Hartford, Conn., as successor to the late James Terry. N. L. Snow, sales manager of the company, has been elected vice-president.

George L. Fairbank, Cleveland, who has a wide acquaintance with the pig-iron, steel, and iron-ore trade with which he has been associated in the central West for 26 years, has embarked in the iron-ore, pig-iron, coal and coke business under the firm name of Fairbank & Co., and has opened offices in the Wade Building,

Cleveland. The firm will act as selling agent for a number of mines in the different Lake Superior districts and will do a jobbing business in pig iron, and in addition will handle coal and coke.

J. B. Ennis, who has been chief mechanical engineer of the American Locomotive Company since 1912, has been appointed vice-president in charge of engineering. He has been connected with the company since its incorporation in 1901, prior to that time being with the Rogers and the Schenectady locomotive works.

Walter F. Sheehan has been elected general manager of the Globe Motor Truck Company, St. Louis. C. T. Schaefer, formerly chief engineer of the Mogul Truck Company, has been chosen head of the engineering department.

Joseph A. Halls has been named to succeed A. L. Montgomery as superintendent of the Youngstown machine shops of the United Engineering & Foundry Co. the change to become effective July 1. Mr. Montgomery was at the Loyd-Booth works 28 years, starting as an apprentice.

E. L. Pierce, Syracuse, N. Y., has been elected president of the Solvay Process Company, succeeding Frederick R. Hazard, deceased. Mr. Pierce has heretofore been vice-president; he is also vice-president of the Semet-Solvay Company. R. G. Hazard, Peacedale, R. I., has resigned as vice-president to become chairman of the Board of Directors, a new position which has been created. Nathan L. Miller has been elected vice-president to succeed Mr. Hazard. R. W. Swift, heretofore assistant treasurer, has been elected treasurer to succeed R. O. MacDaniels, resigned.

Harry D. Sarge, Lebanon, Pa., head of the merchandise sales department of the American Iron & Steel Works of the Bethlehem Steel Company, has resigned.

Col. Washington A. Roebling of John A. Roebling's Sons Company, Trenton, N. J., celebrated his eightieth birthday anniversary on May 26. Mr. Roebling was born in 1837 in Saxtonburg, Pa., and graduated from the Rensselaer Polytechnic Institute, Troy, N. Y., in 1857. In 1869 he assumed the management of the Roebling plant upon the death of his father, John A. Roebling. Col. Roebling is well known as the builder of the Brooklyn Bridge.

Robert Barbour has been elected a director of the Safety Car Heating & Lighting Company, Jersey City, N. J., to succeed his father, William, deceased.

Hon. George W. Loft of New York was elected president of the Federal Iron & Steel Company at the annual stockholders' meeting held in Jersey City, May 22. David A. Newton of the New Jersey bar, was elected secretary. Michael Blake was appointed general manager.

A. G. Hall, consulting engineer, formerly chief city smoke inspector, Cincinnati, Ohio, has opened offices at 408-409 Bell Block.

Hunley Abbott, vice-president and chief engineer of the MacArthur Concrete Pile & Foundation Company, has resigned from that company to accept a position with the Bartlett-Hayward Company, Baltimore.

At a special meeting of the board of directors of the Mutual Motors Company, Jackson, Mich., George E. Drawe, assistant general manager, was elected to the board of directors and treasurer of the company, succeeding W. T. Miller, former treasurer, who has resigned. Mr. Drawe will retain his duties as assistant general manager along with his new work.

Charles S. Butler, advertising manager of the Hess-Bright Mfg. Company of Philadelphia, and C. F. Varoon, formerly chief production engineer of the Greenfield Tap and Die Corporation of Greenfield, Mass., have been appointed sales manager and superintendent of manufacturing, respectively, of the Carlson-Wenstrom Company, subsidiary of the Carwen Steel Tool Company, Philadelphia.

William H. Allen has been appointed sales representative of the United Smelting & Aluminum Company, Inc., with offices at 405 Fulton Building, Pittsburgh.

LIBERTY BOND SUBSCRIPTIONS

Many Companies and Their Employees Are Doing Their Part Liberally

The National Screw & Tack Company, Cleveland, has subscribed for \$700,000 worth of Liberty bonds.

The Chandler Motor Car Company, Cleveland, has taken \$200,000 worth of Liberty bonds and the employees of that company have subscribed for \$100,000 worth.

The Wheeling Steel & Iron Company, Wheeling, W. Va., has subscribed for \$100,000 of Liberty bonds.

About 90 employees of the Globe Malleable Iron Works, Syracuse, N. Y., have subscribed for Liberty loan bonds to the extent of \$5,450.

Employees of the International Nickel Company, Constable Hook, Bayonne, N. J., have subscribed \$97,000 to the Liberty loan bonds. The subscriptions include about 2500 employees, the majority being foreigners.

Employees of the Solvay Processing Company and the Semet-Solvay Company, Solvay, N. Y., have subscribed \$64,950 for the Liberty loan fund in an informal canvass. It is said that this amount will be greatly enhanced by a proposed systematic campaign throughout all departments.

More than half of the employees of the Brown-Lipe-Chapin Company, Syracuse, N. Y., have subscribed for Liberty loan bonds in amounts of from \$50 to \$300.

The Central Steel Company, Massillon, Ohio, and its allied company, the Massillon Rolling Mill Company, are working along original lines in order to make it possible for their employees to buy Liberty bonds without sacrificing any of the interest their savings would earn if deposited in savings banks on a 4 per cent basis. The two companies have voted to pay their employees 4 per cent on all the bonds for which they subscribe, the companies assuming the outlay caused by the difference of $\frac{1}{2}$ of 1 per cent. This plan of guaranteeing 4 per cent removes any sense of hardship and encourages the employees to become subscribers for Liberty bonds.

The Newark Foundrymen's Association, at its meeting, May 23, voted to authorize the treasurer to invest \$500 of the funds of the association in Liberty bonds.

The Baush Machine Tool Company, Springfield, Mass., on May 23, combined an unusually successful Liberty bond sale with its flag-raising exercises. In all 173 workmen have become subscribers to the amount of approximately \$30,000.

Aluminum Company of America Making Large Extensions

The Aluminum Company of America, Pittsburgh, is making some large additions to its plants located in various parts of the country. It is anticipated that the requirements of the Government for aluminum for war purposes will be very heavy, and this company is preparing to fill the Government's orders as promptly as possible, the plant enlargements being made mainly for this purpose. At East St. Louis, Ill., it is putting up a new plant for the refining of bauxite. At Sollers Point, near Baltimore, Md., the company recently purchased 150 acres of land, on which it is putting up another large refining plant, using bauxite from the mines in South America lately acquired by associated interests. The dam and other construction work of the Southern Aluminum Company at Badin, N. C., which the Aluminum Company of America took over in 1915, will be completed about June 15, and the company expects to be making aluminum there about July 1. The development of the water power on the Little Tennessee River is being pushed and will be completed early in 1918. Additions are also being made to the plant at Maryville, Tenn., and this will use the power generated on the Little Tennessee. It is estimated that the capacity for aluminum production in all countries at present slightly exceeds 300,000,000 lb., and of this the Aluminum Company of America is credited with considerably more than one-half.

OBITUARY

WASHINGTON S. TYLER, president of the W. S. Tyler Company, Cleveland, Ohio, and a pioneer manufacturer of that city, died suddenly May 27, aged 82 years. He was born in Cleveland, where he resided nearly his entire life. In 1872 he organized the W. S. Tyler Wire Works Company, which was later succeeded by the present company and the business grew under his leadership from a small plant to one employing about 1100 men. He was noted as a philanthropist and was actively interested as an official in various organizations doing welfare work. He was a member of the governing board of Western Reserve University and a member of several Cleveland clubs.

FRANK CAVANAUGH, treasurer and secretary of Roberts, Winner & Company, Quakertown, Pa., manufacturers of stoves and ranges, died May 21 at the age of 69 years.

British Steel Exports Large in March and Imports Very Small

Despite unrestricted submarine warfare, British steel exports in March were 239,965 gross tons, excluding iron ore and including scrap. This is the largest month this year and brings the total to April 1 to 636,397 tons, which compares with 883,084 tons for the same period in 1916. The exports per month in the first quarter of 1917 were 212,132 tons, or larger than those in the last quarter of 1916, when they were 208,141 tons per month. The present rate is about 67,000 tons per month less than the monthly rate for all of 1916.

The details of these exports have been curtailed decidedly by the British authorities, and their publication is much later than formerly. Pig-iron exports in March were 69,892 tons against 78,000 tons in March, 1916. Ferroalloy exports, mostly ferromanganese, were 10,802 tons, or at the rate of 10,000 tons per month for the first quarter this year.

Rail exports in March were nearly double those for March, 1916. Steel-bar exports continue large, having been 38,057 tons in March, with a total to April 1, 1917, of 103,592 tons, against 165,901 tons to April 1, 1916.

Steel imports were very small in March—25,990 tons—excluding iron ore and including scrap. This compares with 42,974 tons in January and 27,428 tons in February, this year. Iron-ore imports show a slight falling off. They were 494,188 tons in March, 507,000 tons in February and 511,000 tons in January. The total for the first quarter of 1917, however—1,491,219 tons—is larger than that to April 1, 1916, which was 1,471,094 tons.

Locomotive Orders

Locomotive orders in the past week have been 63, of which the Baldwin Locomotive Works will furnish 50 to the British War Office and the American Locomotive Company 6 to the Monongahela Railway. The Chicago & Alton is inquiring for 10 Santa Fes, but the Norfolk & Western has withdrawn its inquiry for 30 locomotives. It is stated that the Siema-Carey Railroad & Canal Company is inquiring for 400 locomotives for use in China, to be delivered in 1918, and also that the Russian Government is definitely inquiring for 300 decapod locomotives, and that this inquiry may result in the purchase of at least 2000. This purchasing is in the hands of the Washington authorities.

Henry Ford intends to proceed with the erection of a large blast furnace plant just outside of Detroit, even if he is forced to do it with his own money, it developed at the Ford-Dodge lawsuit at Detroit last week. The Dodge brothers, who are attempting to force the Ford Motor Company to distribute its surplus, will not prevent the erection of the plant.

Many New Records Made Last Year

Production of Steel Ingots and Castings and Nearly All Kinds of Rolled Material Increased in Last Year

The American Iron and Steel Institute has published two bulletins which show in a very impressive manner the wonderful record of production in 1916 of steel ingots and castings and of various forms of iron and steel rolled products. The total output of ingots and castings was 42,773,680 tons compared with the previous record made in 1915 of 32,151,036 tons. It is noteworthy that the production of ingots by the Bessemer process shows a very large increase, the tonnage being 11,059,039, the largest output by this process since 1907, when 11,667,549 tons was made. The production by the open-hearth process was by far the greatest on record, being 31,415,427 tons compared with 23,679,102 tons, the previous record made in 1915. The crucible output was the largest since 1907 and the production by the electric process far exceeds that of any previous year, it being 168,918 tons in 1916 compared with 69,412 tons in 1915, which was the highest previous record. Included in the production of basic open-hearth steel is the production of duplex ingots and castings, 3,436,457 tons, an increase of 1,654,926 tons or 92.9 per cent over 1915. In 1914 the production was 835,690 tons and in 1913 it was 2,210,718 tons.

PRODUCTION OF STEEL INGOTS AND CASTINGS.

PRODUCTION OF STEEL INGOTS AND CASTINGS BY PROCESSES.

Years	Open-hearth.			Bessemer.	Crucible.	Electric.	Miscellaneous.	Total Gross tons.
	Basic.	Acid.	Total.					
1902	4,496,533	1,191,196	5,687,729	9,138,363	112,772	.....	8,386	14,947,250
1903	4,734,913	1,094,998	5,829,911	8,592,829	102,434	.....	9,804	14,534,978
1904	5,106,367	801,799	5,908,166	7,859,140	83,391	.....	9,190	13,859,887
1905	7,815,728	1,155,648	8,971,376	10,941,375	102,233	.....	8,963	20,023,947
1906	9,658,760	1,321,653	10,980,413	12,275,830	127,513	.....	14,280	23,398,136
1907	10,279,315	1,270,421	11,549,736	11,667,549	131,234	.....	14,075	23,362,594
1908	7,140,425	696,304	7,836,729	6,116,755	63,631	.....	6,132	14,023,247
1909	13,417,472	1,076,464	14,493,936	9,330,783	107,355	13,762	9,185	23,955,021
1910	15,292,329	1,212,180	16,504,509	9,412,772	122,303	52,141	3,194	26,094,919
1911	14,685,932	912,718	15,598,650	7,947,854	97,653	29,105	2,844	23,676,106
1912	19,641,502	1,139,221	20,780,723	10,327,901	121,517	18,309	2,853	31,251,303
1913	20,344,626	1,255,305	21,599,931	9,545,706	121,226	30,180	3,831	31,300,874
1914	16,271,129	903,555	17,174,684	6,220,846	89,869	24,009	3,622	23,513,030
1915	22,308,725	1,370,377	23,679,102	8,287,213	113,782	69,412	1,527	32,151,036
1916	29,616,658	1,798,769	31,415,427	11,059,039	129,692	168,918	604	42,773,680

PRODUCTION OF STEEL INGOTS.

1902	4,384,129	935,791	5,319,920	9,125,815	107,817	.....	2,833	14,556,315
1903	4,600,034	829,529	5,429,563	8,574,730	97,025	.....	3,395	14,104,713
1904	5,007,448	597,894	5,605,332	7,843,089	79,083	.....	2,172	13,529,676
1905	7,609,560	835,267	8,444,826	10,919,272	96,500	.....	2,572	19,463,180
1906	9,345,212	915,310	10,260,522	12,243,229	117,170	.....	3,510	22,624,431
1907	9,912,839	890,372	10,803,211	11,634,276	121,001	.....	989	22,559,477
1908	6,985,420	539,532	7,524,952	6,006,196	55,360	.....	519	13,677,027
1909	13,111,467	781,429	13,892,896	9,296,969	94,672	13,456	786	23,298,779
1910	14,858,353	782,805	15,641,158	9,354,437	107,671	50,821	.....	25,154,087
1911	14,419,306	608,153	15,027,459	7,890,753	83,623	27,227	417	23,029,479
1912	19,197,504	712,371	19,909,875	10,259,151	100,967	14,147	542	30,284,682
1913	19,894,465	905,250	20,800,715	9,465,200	103,655	20,973	587	30,280,130
1914	15,936,985	633,382	16,570,367	6,154,964	78,683	15,458	312	22,819,784
1915	21,975,022	968,148	22,943,170	8,194,737	99,026	46,348	331	31,284,212
1916	29,011,146	1,227,832	30,238,978	10,916,248	120,341	126,048	302	41,401,917

PRODUCTION OF STEEL CASTINGS.

1902	112,404	255,475	367,879	12,548	4,955	.....	5,553	390,935
1903	134,879	265,460	400,348	18,099	5,409	.....	6,409	430,265
1904	98,919	203,915	302,834	16,051	4,308	.....	7,018	330,211
1905	206,159	320,381	526,540	22,103	5,733	.....	6,391	560,767
1906	313,548	406,343	719,891	32,601	10,343	.....	10,870	773,706
1907	366,476	390,049	746,525	33,273	10,233	.....	13,066	803,117
1908	155,005	156,772	311,777	20,559	8,271	.....	5,613	346,220
1909	306,005	295,035	601,040	33,814	12,683	306	8,399	656,242
1910	433,976	429,375	863,351	58,335	14,632	1,320	3,194	940,832
1911	266,626	304,565	571,191	57,101	14,030	1,878	2,427	646,627
1912	443,998	426,850	870,848	68,750	20,550	4,162	2,311	906,621
1913	460,161	450,055	910,216	80,506	17,571	9,207	3,244	1,020,744
1914	334,144	270,173	604,317	65,882	11,186	8,551	3,310	693,246
1915	333,103	402,229	735,332	92,476	14,756	23,064	1,196	866,824
1916	605,512	570,937	1,176,449	142,791	9,351	42,870	302	1,371,763

ALLOY STEEL INGOTS AND CASTINGS.

PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS.

Years	Ingots	Castings	Total	Years	Ingots	Castings	Total
1909	158,978	23,002	181,980	1913	625,430	88,927	714,357
1910	538,462	29,357	567,819	1914	577,107	69,846	646,953
1911	425,169	56,290	481,459	1915	923,251	97,896	1,021,147
1912	689,392	103,109	792,501	1916	1,306,157	56,458	1,362,615

APPROXIMATE PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS, BY PROCESSES, GROSS TONS, 1916.

Processes.	Ingots.	Castings.	Total.
Open-hearth steel—basic	930,348	2,200	932,548
Open-hearth steel—acid	200,573	21,634	222,207
Bessemer steel	59,411	30,883	90,294
Crucible steel	45,622	815	46,437
Electric steel	70,203	926	71,129
Total	1,306,157	56,458	1,362,615

In 1916, there were 109 works in 18 States and the District of Columbia which made alloy steel ingots or castings.

In 1916, 174 works in 25 States and the District of Columbia made steel ingots, against 134 works in 20 States and the District of Columbia in 1915.

In 1916, 230 works in 28 States, the District of Columbia, and the Canal Zone, Panama, made steel castings, against 218 works in 27 States, the District of Columbia, and the Canal Zone, Panama, in 1915.

ROLLED IRON AND STEEL.

In 1916, the production of all kinds of iron and steel rolled into finished forms (including blooms, billets, and axle blanks rolled for forging purposes and semi-finished products which were rolled for export in that year) shows an increase of 7,987,465 tons, or 32.7 per cent., as compared with the output in 1915.

TOTAL PRODUCTION OF ALL KINDS OF FINISHED ROLLED IRON AND STEEL, 1887-1916.

Years	Iron and steel rails	Plates and sheets	Nail plate	Wire rods	Structural shapes	All other finished rolled products	Total Gross tons
1887	2,139,640	603,355	308,432	.....	.....	2,184,279	5,235,706
1888	1,403,700	609,827	289,891	279,769	.....	2,034,162	4,617,249
1889	1,522,204	710,496	259,409	303,851	.....	2,374,958	5,236,928
1890	1,885,307	809,981	251,828	457,099	.....	2,618,860	6,022,875
1891	1,307,176	678,927	223,312	536,607	.....	2,644,941	5,390,963
1892	1,551,844	751,460	201,242	627,829	453,957	2,579,482	6,165,814
1893	1,136,468	674,345	136,113	537,272	387,307	2,104,190	4,975,685
1894	1,021,772	682,900	138,262	673,402	360,305	1,795,570	4,642,211
1895	1,306,135	991,459	95,065	791,130	517,920	2,487,845	6,189,574
1896	1,122,010	985,776	72,137	623,986	495,571	2,236,361	5,515,841
1897	1,647,892	1,207,286	94,054	970,736	583,790	2,497,970	7,001,728
1898	1,981,241	1,448,301	70,188	1,071,683	702,197	3,239,760	8,513,219
1899	2,272,700	1,903,505	85,015	1,036,398	850,376	4,146,425	10,294,410
1900	2,385,682	1,794,528	70,245	846,291	815,161	3,575,536	9,487,441
1901	2,874,639	2,254,425	68,850	1,365,934	1,013,150	4,772,329	12,349,327
1902	2,947,933	2,685,409	72,936	1,574,293	1,300,326	5,383,219	13,944,116
1903	2,992,477	2,599,666	64,102	1,503,455	1,065,813	4,952,183	13,207,697
1904	2,284,711	2,421,398	61,601	1,699,028	949,146	4,597,497	12,013,381
1905	3,375,929	3,532,230	64,542	1,808,088	1,660,519	6,398,107	16,840,015
1906	3,977,887	4,182,156	54,211	1,871,614	2,118,772	7,383,828	19,588,465
1907	3,633,654	4,248,832	52,027	2,017,583	1,940,352	7,972,374	19,964,822
1908	1,921,015	2,649,693	45,747	1,816,949	1,063,181	4,311,608	11,828,193
1909	3,023,845	4,234,346	63,740	2,335,885	2,275,562	7,711,506	19,644,690
1910	3,636,031	4,955,484	45,294	2,241,830	2,266,890	8,475,750	21,621,279
1911	2,822,790	4,488,049	48,522	2,450,453	1,912,367	7,316,990	19,039,171
1912	3,327,915	5,875,080	45,331	2,653,553	2,846,487	9,908,475	24,656,941
1913	3,502,780	5,751,037	37,503	2,464,807	3,004,972	10,030,144	24,791,267
1914	1,945,095	4,719,240	38,573	2,431,714	2,031,124	7,204,444	16,370,196
1915	2,204,203	6,077,694	31,929	3,095,907	2,437,003	10,546,188	24,392,924
1916	2,854,518	7,453,980	30,088	3,518,746	3,029,964	15,493,093	32,380,389

PRODUCTION OF PLATES AND SHEETS.

PRODUCTION OF IRON AND STEEL PLATES AND SHEETS,
1888-1916.

Years.	Gross tons.	Years.	Gross tons.	Years.	Gross tons.
1888	609,827	1898	1,448,301	1908	2,649,693
1889	716,496	1899	1,903,505	1909	4,234,346
1890	809,981	1900	1,794,528	1910	4,955,484
1891	678,927	1901	2,254,425	1911	4,488,049
1892	751,460	1902	2,665,409	1912	5,875,080
1893	674,345	1903	2,599,665	1913	5,751,037
1894	682,900	1904	2,421,398	1914	4,719,246
1895	991,459	1905	3,532,230	1915	6,077,694
1896	965,776	1906	4,182,156	1916	7,453,980
1897	1,207,286	1907	4,248,832		

PRODUCTION OF PLATES AND SHEETS BY SIZE AND MODE OF
MANUFACTURE, GROSS TONS, 1916

Kinds of products.	Iron.	Steel.	Total.
Universal plates, inc. flats or bars over 6 in. wide:			
$\frac{1}{4}$ of an inch and over in thickness	4,013	1,166,952	1,170,965
Under $\frac{1}{4}$ of an inch thick	2	53,267	53,269
Total universal plates	4,015	1,220,219	1,224,234
Sheared plates:			
$\frac{1}{4}$ of an inch and over in thickness	1,142	1,564,500	1,865,642
Under $\frac{1}{4}$ of an inch thick	321	587,187	587,508
Total sheared plates	1,463	2,451,687	2,453,150
Black sheets, made on either sheet or job. mills:			
No. 12 gauge and thicker	29	271,780	271,809
No. 13 gauge and thinner	5,918	1,971,870	1,977,788
Total black sheets	5,947	2,243,650	2,249,597
Black plates rolled on tin mills:			
Black plates for tinning	1,878	1,281,924	1,283,802
Other black plate specialties		243,197	243,197
Total black plates rolled on tin mills	1,878	1,525,121	1,526,999
Grand total of plates and sheets	13,303	7,440,677	7,453,980

PRODUCTION OF WIRE RODS.

PRODUCTION OF WIRE RODS, GROSS TONS, 1888-1916.

Years.	Tons.	Years.	Tons.	Years.	Tons.	Years.	Tons.
1888	279,769	1896	623,996	1904	1,699,028	1912	2,653,553
1889	363,851	1897	970,736	1905	1,808,688	1913	2,464,807
1890	457,099	1898	1,071,683	1906	1,871,614	1914	2,431,714
1891	536,607	1899	1,036,398	1907	2,017,583	1915	3,095,907
1892	627,829	1900	846,291	1908	1,816,949	1916	3,518,746
1893	537,272	1901	1,365,934	1909	2,335,685		
1894	673,402	1902	1,574,293	1910	2,241,830		
1895	791,130	1903	1,503,455	1911	2,450,453		

Small quantities of copper-clad steel wire rods are included in the totals for recent years. It was necessary to estimate the output of one wire-rod plant in 1916.

PRODUCTION OF STRUCTURAL SHAPES.

PRODUCTION OF STRUCTURAL SHAPES, GROSS TONS, 1892-1916.

Years.	Tons.	Years.	Tons.	Years.	Tons.
1892	453,957	1901	1,013,150	1910	2,266,890
1893	387,307	1902	1,300,326	1911	1,912,367
1894	360,305	1903	1,095,813	1912	2,846,487
1895	517,920	1904	949,146	1913	3,004,972
1896	495,571	1905	1,660,519	1914	2,031,124
1897	583,790	1906	2,118,772	1915	2,437,003
1898	702,197	1907	1,940,352	1916	3,029,964
1899	850,376	1908	1,083,181		
1900	815,161	1909	2,275,562		

PRODUCTION OF HEAVY AND LIGHT STRUCTURAL SHAPES,
GROSS TONS, 1912-1916.

Years.	Heavy shapes.	Light shapes.	Total.
1912	2,470,415	376,072	2,846,487
1913	2,553,806	451,166	3,004,972
1914	1,787,281	243,843	2,031,124
1915	2,031,407	405,596	2,437,003
1916	2,649,961	380,003	3,029,964

All the heavy structural shapes were rolled from steel.

PRODUCTION OF MERCHANT BARS.

PRODUCTION OF MERCHANT BARS, SHOWING IRON AND STEEL.
MERCHANT BARS SEPARATELY, GROSS TONS, 1905-1916.

Years.	Iron.	Steel.	Total.	Years.	Iron.	Steel.	Total.
1905	1,322,439	2,271,162	3,593,601	1911	835,625	2,211,737	3,047,362
1906	1,481,348	2,510,852	3,992,200	1912	944,790	2,752,324	3,697,114
1907	1,440,356	2,530,632	3,970,988	1913	1,026,632	2,930,977	3,957,609
1908	685,233	1,301,405	1,986,638	1914	563,171	1,960,460	2,523,631
1909	952,230	2,311,301	3,263,531	1915	657,107	3,474,135	4,131,242
1910	1,074,163	2,711,568	3,785,731	1916	993,948	5,625,598	6,619,546

PRODUCTION OF CONCRETE BARS.

PRODUCTION OF CONCRETE BARS, SHOWING IRON AND STEEL.
CONCRETE BARS SEPARATELY, GROSS TONS, 1909-1916.

Years.	Iron.	Steel.	Total.	Years.	Iron.	Steel.	Total.
1909	.....	159,352	159,352	1913	113	319,557	319,670
1910	4,645	236,464	241,109	1914	.....	288,471	288,471
1911	2,388	256,353	258,741	1915	.....	353,408	353,408
1912	2,500	271,832	274,332	1916	2,683	458,717	461,400

Statistics are not available prior to 1909.

PRODUCTION OF SKELP.

PRODUCTION OF SKELP, SHOWING IRON AND STEEL SKELP
SEPARATELY, GROSS TONS, 1905-1916.

Years.	Iron.	Steel.	Total.	Years.	Iron.	Steel.	Total.
1905	452,797	983,198	1,435,995	1911	322,397	1,658,276	1,980,673
1906	391,517	1,137,068	1,528,585	1912	327,012	2,119,804	2,446,816
1907	444,536	1,358,091	1,802,627	1913	312,746	2,189,218	2,501,964
1908	297,049	863,534	1,160,583	1914	264,340	1,716,091	1,980,431
1909	370,151	1,663,230	2,033,381	1915	262,198	2,037,266	2,299,464
1910	350,578	1,477,616	1,828,194	1916	355,445	2,572,229	2,927,674

In 1916, 45 plants in 5 States rolled iron or steel skelp, as compared with 45 works in 5 States in 1915.

PRODUCTION OF MISCELLANEOUS ROLLED
PRODUCTS.PRODUCTION OF MISCELLANEOUS ROLLED IRON AND STEEL
PRODUCTS, GROSS TONS, 1916.

Miscellaneous rolled products.	Iron.	Steel.	Total.
Hoops	630	307,534	368,164
Bands and cotton-ties	.....	173,311	173,311
Long angle splice bars, fish-plate bars, tie-plate bars, and other rail joint shapes	77,656	614,164	691,820
Roller sheet piling, not including fabricated	.....	19,196	19,196
Railroad ties	.....	34,311	34,311
Roller forging blooms, forging billets, etc.	549	2,015,411	2,015,960
Blooms, billets, sheet bars, etc., for export	.....	512,483	512,483
Spike and chain rods, bolt and nut rods, horseshoe bars, strips, etc.	372,688	1,296,540	1,669,228
Total	451,523	5,032,950	5,484,473

PRODUCTION OF FINISHED ROLLED IRON AND STEEL BY LEADING
PRODUCTS, GROSS TONS, 1916.

Products.	Iron.	Steel.	Total.
Rails	.....	2,854,516	2,854,516
Plates and sheets	13,303	7,440,677	7,453,980
Nail and spike plate	2,979	27,109	30,088
Wire rods	867	3,517,879	3,518,746
Structural shapes	1,823	3,028,141	3,029,964
Merchant bars	993,948	5,625,598	6,619,546
Bars for reinforced concrete work	2,683	458,717	461,400
Skelp, flue, and pipe iron or steel	355,445	2,572,229	2,927,674
Long angle splice bars, tie-plate bars, etc.	77,656	614,164	691,820
Hoops	630	307,534	368,164
Bands and cotton-ties	.....	173,311	173,311
Roller sheet piling, not including fabricated	.....	19,196	19,196
Railroad ties	.....	34,311	34,311
Roller forging blooms, forging billets, etc.	549	2,015,411	2,015,960
Exports of blooms, billets, sheet bars, etc.	.....	512,483	512,483
All other finished rolled products	372,688	1,296,540	1,669,228
Total	.....	.....	.....

Total Gross tons. 1,822,971 30,557,818 32,380,789

PRODUCTION OF TINPLATES AND TERNE PLATES

PRODUCTION OF TINPLATES AND TERNE PLATES, 1891-1916.

Years.	Tinplates.	Terne plates.	Total pounds.
1891 (second 6 months).....	368,400	1,868,343	2,236,743
1892 (calendar year).....	13,921,296	28,197,896	42,119,192
1893.....	64,536,209	59,070,498	123,606,707
1894.....	102,223,407	64,120,002	166,343,409
1895.....	165,927,907	88,683,488	254,611,395
1896.....	270,151,785	89,058,013	359,209,798
1897 (first 6 months).....	203,028,258	49,545,643	252,573,901
1897 (second 6 months).....			322,205,619
1898 (calendar year).....			732,289,600
1899.....			808,360,000
1900 (cen. year end. May 31).....	707,718,239	141,285,783	*850,004,495
1901 (calendar year).....			894,411,840
1902.....			806,400,000
1903.....			1,075,200,000
1904 (cen. year end. Dec. 31).....	867,526,985	158,857,866	*1,032,940,706
1905 (calendar year).....			1,105,440,000
1906.....	1,100,373,000	193,367,000	1,293,740,000
1907.....	996,650,000	156,447,000	1,153,097,000
1908.....	1,048,896,000	154,179,000	1,203,075,000
1909.....	1,179,858,000	190,930,000	1,370,788,000
1910.....	1,450,821,000	168,184,000	1,619,005,000
1911.....	1,597,629,000	158,441,000	1,756,070,000
1912.....	1,965,659,000	191,396,000	2,157,055,000
1913.....	1,708,186,000	136,944,000	1,845,130,000
1914.....	1,939,785,000	146,195,000	2,085,980,000
1915.....	2,201,825,054	163,470,646	2,365,295,700
1916.....	2,552,224,275	214,176,952	2,766,401,227

* Includes 1,000,473 pounds in 1900 and 6,555,555 pounds in 1904 of "other sheet iron and sheet steel, tin or terne plated."

PRODUCTION OF COKE AND CHARCOAL TINPLATES, 1916.

States.	Coke. Pounds.	Charcoal. Pounds.	Total. Pounds.
Pennsylvania.....	1,355,874,609	24,068,345	1,379,942,954
Maryland, West Virginia.....	432,917,863	26,404,888	459,322,751
Ohio, Indiana, Ill., Michigan.....	705,855,824	7,102,746	712,958,570
Total.....	*2,494,648,296	57,575,979	2,552,224,275

* Includes 5,840,169 pounds which were formed or stamped from black plates by companies which manufacture tinplates and tinned after the completion of the forming or stamping process.

APPROXIMATE CONSUMPTION OF TINPLATES AND TERNE PLATES, GROSS TONS, 1900-1916.

Calendar years.	Production.	Add imports.	Deduct exports.	Approximate consumption.
1900 (census year).....	*379,460	60,386	273	439,579
1901.....	399,291	77,395	439	476,247
1902.....	360,000	60,115	1,566	418,549
1903.....	480,000	47,360	292	527,068
1904 (census year).....	*461,134	70,652	7,898	523,888
1905.....	493,500	65,740	7,941	551,299
1906.....	577,562	56,983	12,082	622,463
1907.....	514,775	57,773	10,203	562,345
1908.....	537,087	58,490	11,878	583,699
1909.....	611,959	62,593	9,327	665,225
1910.....	722,770	66,640	12,445	776,965
1911.....	783,960	14,099	61,381	736,678
1912.....	962,971	2,052	81,694	883,329
1913.....	823,719	20,680	57,812	786,587
1914.....	931,241	15,411	59,549	887,103
1915.....	1,055,936	2,350	154,642	903,644
1916.....	1,235,000	18008	227,391	1,008,617

* For 1900 the census year ended May 31, 1900; for 1904, December 31, 1904.

PRODUCTION OF GALVANIZED SHEETS.

PRODUCTION OF IRON AND STEEL GALVANIZED SHEETS.

Products.	1916—Pounds.		
	Iron.	Steel.	Total.
Galvanized sheets.....	2,026,494	1,344,898,456	1,346,924,950
Galvanized formed products*.....	1,051,482	129,250,713	130,302,195
Total.....	3,077,976	1,474,149,169	1,477,227,145

Products.	1915—Pounds.		
	Iron.	Steel.	Total.
Galvanized sheets.....	32,614,505	1,548,954,701	1,581,569,206
Galvanized formed products*.....	1,115,440	111,152,350	112,267,790
Total.....	33,729,945	1,660,107,051	1,693,836,996

* Articles formed or stamped from iron or steel black plates or black sheets and galvanized after the completion of the forming or stamping process.

PRODUCTION OF PIPES AND TUBES

PRODUCTION OF WROUGHT IRON AND STEEL PIPE AND BOILER TUBES, 1915-1916.

Kinds of pipe.	1915—Gross tons.			1916—Gross tons.		
	Iron.	Steel.	Total.	Iron.	Steel.	Total.
Black, standard.....	112,470	711,297	823,767	110,694	1,021,949	1,132,643
Galvanized.....	27,702	253,242	280,944	28,540	262,473	291,013
Oil country goods.....	39,753	563,167	602,920	85,805	854,686	940,491
O. D. and misc.....	108	115,005	115,113	136	138,627	138,763
Boiler tubes.....	26,480	70,450	96,930	52,942	95,206	148,148
Total.....	206,513	1,713,161	1,919,674	278,117	2,372,941	2,651,058

PRODUCTION OF CAST IRON PIPE, NET TONS, 1915-1916.

Kinds of pipe.	1915—Net tons.			1916—Net tons.		
	Pipe.	Fittings.	Total.	Pipe.	Fittings.	Total.
Gas and water*.....	911,901	44,471	956,372	874,129	60,497	934,626
Soil and plumbers'.....	184,869	73,629	258,498	206,494	73,213	279,707
Total.....	1,096,770	118,100	1,214,870	1,080,623	133,710	1,214,333

* Includes culvert pipe. Manufacturers able to separate their production report 27,014 tons of culvert pipe in 1916 and 25,140 tons in 1915.

PRODUCTION OF HAMMERED CHARCOAL IRON BLOOMS, BILLETS, ETC.

Years.	For sale.	For own use.	Total. Gross tons.	Years.	For sale.	For own use.	Total. Gross tons.
1907.....	17,554	67,069	84,623	1912.....	250	65,557	65,807
1908.....	8,103	47,870	55,973	1913.....	80	59,313	59,393
1909.....	9,593	46,772	56,365	1914.....	5,026	36,399	41,425
1910.....	14,016	61,958	75,974	1915.....	902	42,219	43,121
1911.....	2,271	62,345	64,616	1916.....	5,405	75,280	80,685

PRODUCTION OF CUT AND WIRE NAILS.

PRODUCTION OF WIRE NAILS IN 100-LB. KEGS, 1888-1916.

Years.	Production.	Exports.	Consumption.	Years.	Production.	Exports.	Consumption.
1888.....	1,500,000	13,414	1,486,586	1903.....	9,631,661	704,546	8,927,115
1889.....	2,435,000	19,172	2,415,828	1904.....	11,926,661	734,554	11,192,107
1890.....	3,135,911	18,395	3,117,516	1905.....	10,854,892	799,734	10,055,158
1891.....	4,114,385	18,966	4,095,399	1906.....	11,486,647	1,035,705	10,450,942
1892.....	4,719,524	21,387	4,698,137	1907.....	11,731,044	945,035	10,786,009
1893.....	5,095,945	27,451	5,068,494	1908.....	10,662,972	593,819	10,069,153
1894.....	5,681,801	38,920	5,642,881	1909.....	13,916,053	686,087	13,229,966
1895.....	5,841,403	53,012	5,788,391	1910.....	12,704,902	960,295	11,744,607
1896.....	4,719,560	95,638	4,623,922	1911.....	13,437,778	1,200,957	12,236,821
1897.....	8,997,245	129,767	8,867,478	1912.....	14,659,700	1,530,353	13,129,347
1898.....	7,418,475	307,190	7,111,285	1913.....	13,559,727	977,477	12,582,250
1899.....	7,618,130	750,781	6,867,349	1914.....	13,132,814	809,167	12,323,647
1900.....	7,233,979	613,858	6,620,121	1915.....	14,583,026	2,051,475	12,531,551
1901.....	9,803,822	420,506	9,383,316	1916.....	17,147,665	3,363,876	13,783,789
1902.....	10,982,246	595,391	10,386,855				

PRODUCTION OF CUT NAILS IN 100-LB. KEGS, 1888-1916.

Years.	Production.	Exports.	Consumption.	Years.	Production.	Exports.	Consumption.
1888.....	6,493,591	121,606	6,371,985	1903.....	1,435,893	199,126	1,236,767
1889.....	5,810,758	117,967	5,692,791	1904.....	1,283,362	207,720	1,075,642
1890.....	5,640,946	134,374	5,506,572	1905.....	1,357,549	176,741	1,180,808
1891.....	5,002,176	103,836	4,898,340	1906.....	1,189,239	169,519	1,019,720
1892.....	4,507,819	152,686	4,355,133	1907.....	1,109,138	155,212	953,926
1893.....	3,048,933	131,910	2,917,023	1908.....	956,182	157,319	798,863
1894.....	2,425,060	183,229	2,241,831	1909.....	1,207,597	222,565	985,032
1895.....	2,129,894	176,394	1,953,500	1910.....	1,005,233	182,087	823,146
1896.....	1,615,870	237,088	1,378,782	1911.....	967,636	255,854	711,782
1897.....	2,106,799	337,732	1,769,067	1912.....	978,415	208,568	769,847
1898.....	1,572,221	352,473	1,219,748	1913.....	842,038	84,885	757,153
1899.....	1,904,340	223,425	1,680,915	1914.....	769,665	76,676	692,989
1900.....	1,573,494	250,053	1,323,441	1915.....	775,327	94,878	680,449
1901.....	1,542,240	208,359	1,333,881	1916.....	764,835	106,451	658,384
1902.....	1,633,762	161,228	1,472,534				

PRODUCTION OF FORGED IRON AND STEEL BY ROLLING MILLS AND STEEL WORKS.

Years.	Production—Gross tons.			Years.	Production—Gross tons.		
	Iron.	Steel.	Total.		Iron.	Steel.	Total.
1907.....	23,772	357,033	380,805	1912.....	9,155	383,365	392,520
1908.....	13,646	117,497	131,143	1913.....	27,892	380,091	407,983
1909.....	25,523	223,741	249,264	1914.....	3,675	337,746	341,421
1910.....	20,410	299,452	319,862	1915.....	2,814	520,909	523,723
1911.....	4,034	214,202	218,236	1916.....	3,352	920,415	923,767

The Manufacture of Steel Castings*

A Historical Résumé of Progress in the Industry — Merits of Different Processes—Overcoming Inherent Difficulties

BY ROBERT P. LAMONT



R. P. Lamont

record its early history or to keep any record of its development. A fairly complete search through several scientific libraries, and the available literature on the subject, has disclosed some interesting facts.

Cast Steel and Steel Castings

Every ton of steel produced by present methods may properly be called cast steel, but only a comparatively small percentage of this steel in its final form may be correctly described or referred to as steel castings. There would seem to be a rather small margin of difference between pouring the molten metal into an ingot mold preparatory to its being rolled or forged, and pouring the same metal into a mold in which it takes its final form and shape. Looking at it now, it doesn't seem as if it should require any great inventive skill to step from one process to the other. In principle it is a simple matter, but the practical difficulties were great and the developments of the cast-steel industry was correspondingly slow.

Because of this rather narrow line between the first stage of ordinary steel making and what is in a sense the final stage of making steel castings, it is difficult to point out any definite place and date at which it can be said with certainty, "Here is where the making of steel castings began." In the large volume of literature on the early history of steel making there are practically no references to steel castings. The art, if it may be so called, was no doubt a gradual development, and no single name stands out prominently as the inventor of steel castings as now produced.

Developing the Industry in Europe

However, there seems to be no question but that the credit for making the first steel casting belongs to Germany. In the report of our Federal Commissioner William P. Blake, to the Vienna Exposition of 1873, in describing the exhibit of the Bochum Steel Works in Westfalia, this statement is made: "One of the special operations in this works is the casting of steel in molds, after the invention of the technical director of the works, Jacob Mayer." Although the process was not patented in the country, it remained for ten years the exclusive property of the company and of those works in France and England which had obtained the rights to manufacture. The report continues: "Another specialty of these works is the manufacture of cast-steel bells. We have not space to detail all of the advantages and virtues of cast-steel bells." Their manufacture dates from 1851. As early as 1855, at the Paris Exposition, the bells of the company attracted general attention.

The surprise of the inspectors at this new steel product, indeed the doubt as to the possibility of work-

ing steel in this way, was so great that they desired an inquiry to be made to ascertain whether these bells were really steel, as was represented, or whether they were made of cast iron. The result of the inquiry was the bestowal of the Great Gold Medal by the jury of the Exposition upon the following grounds: "The exhibited bells are characterized by perfection of performance, and a very clear unmixed tone, which is as clear as that of the ordinary bronze bells." As a consequence the jury came to the conclusion that the Bochum Company, by its method of molding and pouring steel, had not only superseded bronze as the material for bells, but had given a new direction to the manufacture of large forged and rolled pieces of machinery. The bells were cheap, costing about one-half as much as bronze bells; they were heavy, and since 1855 their manufacture had greatly and rapidly increased. In the year 1858 a test proved "that it is impossible with human power to crack one of these steel bells with heavy sledge hammers."

The steel in these early castings was melted in crucibles and cast in metal molds. Jacob Mayer is the only individual name mentioned in this reference to the early history of steel castings, but it is not clear from the report whether the technical director in 1873 was the originator of the industry which apparently started in 1851.

Immediately after the Paris Exposition of 1867 the Terre Noire Works of France began a series of experiments to produce a metal to meet the requirements for projectiles for navy guns. They used a Siemens-Martin furnace, and the subject was gone into thoroughly from a metallurgical standpoint probably for the first time. A number of irons were tried with the addition of a certain amount of steel scrap before casting. The results showed that the addition of scrap improved the iron, but the variations in the breaking points of the steel were found to correspond with the amounts of silicon it contained. If the addition of steel scrap was pushed beyond a certain limit, blow-holes began to appear. Experiments showed that projectiles made of this steel would not stand up in test. It was determined that to obtain steel without blow-holes, a proportion of 11 per cent to 12 per cent of pig containing 3.5 per cent to 4 per cent of silicon should be added. This gave a hard metal and proved unsatisfactory. The metal was pasty, ran badly, and did not stand forging well. It was found necessary to add a certain amount of manganese in the initial bath, which made the slag sufficiently fluid to separate from the metal. It was of greatest importance to keep the oxidation as low as possible, and the process finally resolved itself to the employment of manganese and silicon in definite proportions and at regulated times. The metal was tapped directly into the molds, there being two tap holes, side by side, running into one spout fitted with two nozzles.

About 1870 this company was producing all sorts of industrial castings, such as cast-steel car wheels, frogs, roll-pinions, etc. It was not until 1875 that the Terre Noire Company produced a cast-steel shell which would go unharmed through armor plate. By 1879 this company was producing 200 tons of steel castings per month, about half of which consisted of projectiles for the French Government. The elastic limit of the steel was about from 16 to 28 tons per sq. in., with an elongation of from 2.5 to 15 per cent. At the Paris Exposition of 1878 the Hadfield Steel Foundry Company of England exhibited double spur wheels, railway crossings, wheels, pulleys, hydraulic cylinders, etc.

Early Development in the United States

In the United States a few attempts were made during the Civil War to produce small field pieces of

*From a paper presented at the twelfth general meeting of the American Iron and Steel Institute in New York, May 25, 1917. The author is president of the American Steel Foundries, Chicago.

cast steel. A number of steel works are reported to have made steel castings for their own use during this period. The best information indicates that the first steel castings produced in this country, which were of value commercially, were made in July, 1867, by the William Butcher Steel Works, which afterwards became the Midvale Steel Works. These were crossing frogs for the Philadelphia & Reading Railway and were made of crucible steel. This was before the adoption of silicon for solidifying steel, and the castings were much honeycombed in all parts, except the wearing surfaces, which were solid and very smooth. The excessive sponginess of these castings, however, prevented their general use, although W. F. Durfee, who was superintendent in 1871, stated that they made quite a number of steel castings for reversible frogs, which weighed from 250 to 900 lb.

In 1870 William Hainsworth of Pittsburgh erected a small furnace having two crucibles, and made castings for the cutting parts of agricultural implements. He kept on experimenting until his capital was nearly exhausted, but in March, 1871, he incorporated a company and erected a plant at Pittsburgh. This was known as the Pittsburgh Steel Casting Company, and was one of the first steel foundries in the country. In making his molds Mr. Hainsworth used ground coke mixed with ground plumbago crucibles, German clay, and all tempered with glue water. On this mixture he took out a patent.

In the latter part of 1874 Mr. Hainsworth had an open-hearth furnace constructed, which in 1875 was used in making steel castings. These, I believe, were the first steel castings from an open-hearth furnace in this country.

On April 28, 1876, the Midvale Steel Company made two hammer dies of open-hearth cast steel, and the next month made a hammer head weighing 2535 lb. The appearance of these castings was against them, as the surfaces were imperfect and the sand adhered to them in large quantities. There was also considerable trouble caused by piping and cracking. The first use of the Bessemer process for making steel castings is said to have been made by Mr. Hainsworth in 1881.

One writer during this period states that castings of plain section, weighing 100 lb., sold as high as 20 to 25 cents per pound. However, from 1867 to 1880 the output of steel castings was very small.

A number of other plants now commenced producing steel castings. One of these which achieved unusual success was Mackintosh, Hemphill & Co., Pittsburgh, better known as the "Old Fort Pitt Foundry." They began the manufacture of steel castings by the Terre Noire process in 1881 and 1882.

In 1882 the Solid Steel Casting Company was founded by J. K. Bole, S. T. Wellman, T. R. Morgan, Sr., and S. J. Williams. The plant was erected at Alliance, Ohio, and the first steel was made in a 3.5-ton open-hearth furnace. This is now the Alliance plant of the American Steel Foundries.

Another plant built about 1882 was the Standard Steel Castings Company of Thurlow, Pa. This firm first made castings by the crucible process, but installed an open-hearth furnace in September, 1884. They were unusually successful with large work, furnishing many steel castings for government vessels. This is now the Thurlow plant of the American Steel Foundries, and still turns out many castings for battleships, cruisers and other large vessels. At the present time it has just finished all of the castings for super-dreadnaughts Pennsylvania and Arizona, and has on hand unfilled orders for castings for nine battleships and cruisers.

About this time, i.e., about 1882, the business began to develop more rapidly, and in 1885 there were quite a number of successful plants in operation, among which may be mentioned: Solid Steel Casting Company, Alliance, Ohio; I. G. Johnston & Co., Spuyten Duyvil, N. Y.; S. G. Flagg & Co., Philadelphia, Pa.; Chester Steel Castings Company, Chester, Pa.; Pittsburgh Steel Casting Company, Pittsburgh, Pa.; Mackintosh, Hemphill & Co., Pittsburgh, Pa.; Cowing Steel Castings Company, Cleveland, Ohio; Eureka Steel Casting Company,

Chester, Pa.; Standard Steel Casting Company, Chester, Pa.

Early Difficulties With Molds

Much difficulty was experienced with molding sand in these early days, and it was claimed that the Midvale people, for instance, lost money regularly on steel castings for years while trying one mixture after another. At first a molding mixture of ground brick, ground pots and fire clay was used. The next step was to leave the ground pots out of the mixture, and to wash the mold with finely ground clay fire brick. This made a marked improvement in the general appearance of the castings. However, the mold became hard, and intricate castings could not be made on account of cracks. Next, a mixture of sand and flour was tried, but there was a tendency for the flour to burn out. By 1887 a suitable mixture of sand and molasses had been obtained.

George Cowing, of Cleveland, is credited with first making a mold for steel castings composed of nearly pure silica, glue water and molasses. At this time all molds were baked in ovens, but efforts were being made toward perfecting a process to allow the casting of small shapes in green sand. This was probably first attempted successfully by steel founders in the St. Louis district, which had now become quite prominent in the steel-casting industry. In general, castings produced about this time were anything but satisfactory. In large castings particularly the earlier molds would burn onto the metal, or the metal would penetrate the molds in a spongy mass, requiring a great deal of labor and expense for chipping.

Reference is made by writers in the 80's to pinions weighing 13,000 lb. requiring two weeks to clean, and on which there was a piece-work price of \$2 per tooth. It must be remembered that at this time there were no pneumatic hammers. These first castings were hard, brittle, and not homogeneous. They were so full of blow-holes that one writer defined the ordinary steel casting as a rough chunk composed of about equal parts of steel and holes. The shrinkage problem was more difficult than with gray iron castings, and it took years of patient effort to overcome the difficulties involved. In an article of THE IRON AGE of Oct. 1, 1883, P. G. Salom, president Standard Steel Casting Company, Thurlow, Pa., said: "It is almost impossible to make certain thin complicated castings of steel on account of shrinkage troubles."

Although the field for steel castings kept widening, they were not giving universal satisfaction. Their appearance was against them. Very few of the foundries had their own laboratories. In going over the history of the business during this period—1880, say to 1890—one gets the impression that the castings were pushed on the market before the art was fully developed, and with the result that steel castings fell into a certain disfavor which seemed to retard the progress of the industry for several years.

Our own Government was one of the first to experiment with and make extensive use of steel castings in this country, especially for battleships. Between 1880 and 1890 the English founders were successfully turning out stern frames, rudders and stem pieces. Our own people apparently had not acquired the same skill, for in his report for 1890 Engineer-in-Chief Melville, of the Navy Department, stated, "I am obliged to report we are having a most discouraging experience with steel castings." He further stated that when the first new vessels were being built, the steel founders claimed that they could cast anything in steel that could be cast in iron, but that there was now (1890) a wide diversity among steel founders as to what shapes were practicable for casting in steel.

Guns of Cast Steel

In 1887 Congress passed an Act calling for the manufacture of three cast-steel, 6-in. breech-loading rifles, to be made by the crucible, open-hearth or Bessemer processes, and to weigh approximately 11,000 lb. each. Only two were supplied: one of Bessemer steel and one of open-hearth steel. In the tests the Bessemer gun failed at the second round. The open-hearth steel rifle

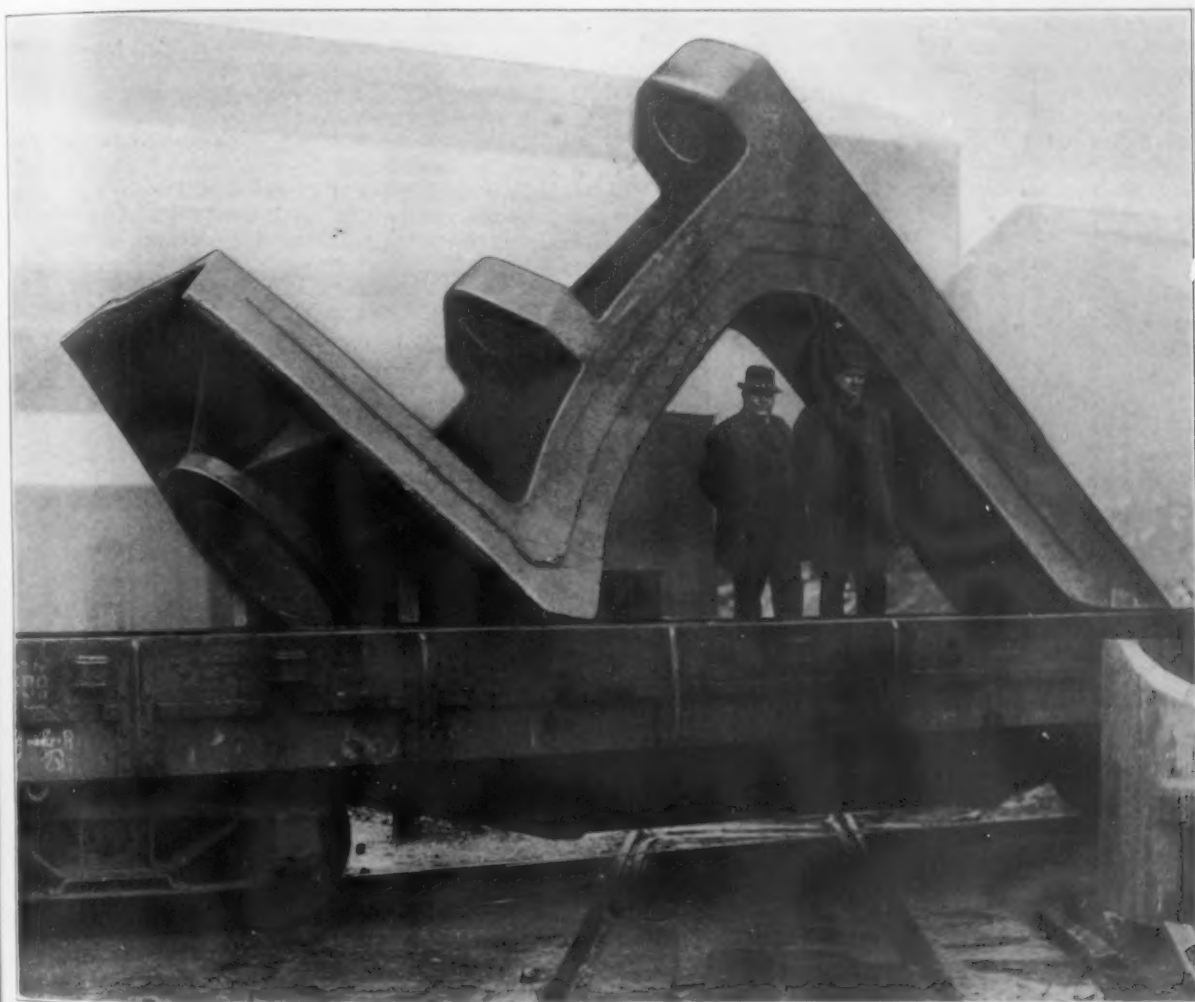
was cast by the American Steel Casting Company of Thurlow, Pa., and was not submitted to any mechanical treatment after casting. Although it stood the statutory test of ten rounds under service charge, there was a slight increase in the diameter of the barrel after the tests and the Government rejected the gun. Failure of these tests caused a good deal of comment at the time and discouraged further efforts along this line.

Although at the present time a very large percentage of all steel castings produced in the country are used by the railroads, it is interesting to know that as late as 1885 very few were being used on cars or locomotives. At a meeting in Washington this year, the Railway Master Mechanics' Association devoted some time to a discussion of their use. A number of the members were using steel castings for cross heads only, and on a few roads driving boxes, link hangers, eccentrics and rocker arms, in addition, were being made of

used. These first frames were light and of simple design, as compared with those now made every day as a matter of ordinary routine. At the present time frames are not infrequently 34 ft. long, and weigh up to 14,000 lb. The percentage of loss in a good foundry does not exceed four.

Development During Recent Years

During the past 20 years the development of the steel-casting industry has been steady and rapid, although, of course, the production has had ups and downs following general business conditions. Beginning with the nominal production of 1684 tons in 1883, by 1897 the production had increased to approximately 100,000 tons. To-day there are about 200 steel foundries in the country, with a total rated capacity of approximately 2,000,000 tons, though the actual production given for last year was probably about 1,500,000



A Large Modern Steel Casting—Stern Post for the Battleship California. Weighing 44,546 Lb. It was made at the Thurlow plant of the American Steel Foundries

cast steel. The Pennsylvania Railroad specifications in 1888 for steel castings required tensile strength of 70,000 lb. and an elongation of 15 per cent in 2 in.

At the Chicago Exposition in 1893 there were exhibited by Krupp some steel castings which at that time were considered very remarkable, among them being a cast-steel frame for a Pennsylvania Railroad locomotive. At a meeting of the American Society of Mechanical Engineers at the time, doubt was expressed as to whether any American steel foundry could make such a casting. A contrary opinion was expressed to the effect that possibly three or four steel foundries in this country could make such a casting, but that probably several castings would be lost before a successful one could be produced. Stimulated possibly by this exhibit and by the growing demand, American manufacturers soon demonstrated their ability to make these frames, for five years later they were being generally

tons. The exact figures are not yet available. The production curve for steel castings for the past 20 years plotted alongside of one showing, for instance, the ingot production of the country shows a considerably more rapid rate of increase for steel castings.

While the product even yet cannot be said to be perfect, a great deal of careful, painstaking, intelligent study has been given to overcoming the difficulties in the processes, and it can at least be said that steel castings have to a large extent lived down the somewhat uncertain reputation earned during the first development period.

The Quebec Bridge Disaster

In this connection I think it not out of place to refer to the disaster to the center span of the great Quebec bridge on Sept. 11 last. Practically all of the early newspaper accounts, and even a good many of the tech-

nical journals which were published before a thorough investigation was made, gave as the cause of the accident the failure of a steel casting. One of the railroad journals went so far as to say, "It was the well-known treachery of a steel casting." After there had been ample time for a complete investigation it was decided by authority that it was a clear case of a badly designed casting.

Merits of Different Methods

Of the approximately 2,000,000 tons capacity of steel castings in the country to-day about 52 per cent is for basic and 48 per cent acid steel. Almost 90 per cent is produced in open-hearth furnaces, 8 per cent in the converter, and the balance crucible and electric. We have no accurate figure showing a division of tonnage as between dry and greens and molds, but the figures are probably not far from 60 per cent green sand and 40 per cent dry sand.

A comparatively recent important development in the industry was the coming in of the electric furnace. If it has not already done so, it will entirely replace crucibles and converters as a means of melting. Steel melted in the electric furnace can be brought to almost any state of purity desired, and a very high temperature can be secured. The electric furnace will produce steel of as good quality and at lower cost than the crucible, assuming, of course, a reasonable price for current, and sufficient demand to take the output of the furnace.

It is not necessary here to describe the difference between the acid and basic methods, but it might be well to say that practically all machine castings—castings requiring any machine finish—are made of acid steel, while all miscellaneous car castings, such as bolsters, side frames, center-plates, couplers, etc., which do not require machining, are made of basic steel and in green sand molds.

Acid steel castings, particularly if made in dry sand molds, as a rule present a better external surface and are freer from pinholes and surface defects. When you get below the surface, however, a test of basic steel will show just as good physical properties as the acid steel. The production of acid as compared with basic steel is less complicated from a mechanical standpoint, and is rather more generally susceptible of control in the matter of soundness or freedom from blow-holes. The fact that it takes about an hour as a rule to pour an average heat into steel castings, means, of course, that the slag is in contact with the top of metal in the ladle just this length of time, and the basic slag takes up the silicon from the steel and in return gives up substantial amounts of phosphorus, with the result that the last metal to leave the ladle is inclined to be "wild," resulting in porous castings, and sometimes a rather high percentage of phosphorus. This difficulty is not met in the acid steel.

Cost of Acid and Basic Steels

There is, I think, a somewhat mistaken impression as to the difference in cost between acid and basic steels. At the present time low phosphorus pig, which is used in the acid process, is selling for about \$75 per ton, and low phosphorus scrap \$40 per ton, while basic pig is, say, \$42 at Pittsburgh, and heavy melting scrap about \$32. Taking into account simply the difference between these figures, apparently the acid steel would be very much more expensive than the basic. However, when account is taken of the fact that a much smaller percentage of pig is used in an acid heat than in a basic heat—that the melting time is considerably shorter, the melting loss being about 2.5 per cent of the metals charged, and the life of the furnace substantially longer—the difference in cost is not great. At the present time, taking all factors into account, I should say that in the Chicago territory, for instance, the difference in cost is not more than \$2 per ton, in favor of the basic steel.

The so-called dry sand mold is made of a mixture of silica sand and fire clay, modified in some cases with small percentages of rosin, dextrine or flour. After the mold is finished it is dried in an oven, which is kept at a temperature of about 500 deg. Fahr. for from six hours to six days, depending upon the volume of sand

to be dried. This drying process, of course, ties up a large amount of flask equipment, requires a great deal of fuel and extra handling, and adds at least \$1 per ton to the cost of the castings over the green sand method. In the case of large, rangy castings, such as stems, stern posts and rudders for battleships, the molds have to be rammed, then split up into sections, which are dried separately, and finally fitted together on the dry floor before the casting is poured. Under ordinary conditions such a mold is in process of construction ten days to two weeks before it is ready for the metal. In the case of the steamship *Prinzess Irene*, which went aground on the shore of Long Island, April 6, 1911, the steamship company was anxious, of course, to get the vessel back into the service as promptly as possible, and offered a liberal bonus for the completion of a new sectional stern frame in less time than was usually taken for such a casting. The record in this case was eleven days, and the bonus earned was almost equal to the price of the casting.

Green sand is composed of silica sand and silicious fire clay, in the proportion of about one clay and ten sand, all thoroughly bonded in a heavy sand mill. These molds can be filled immediately after they are prepared, in fact, the sooner the better, for if they are allowed to stand unusually long the cores take up considerable moisture, and in dry weather the sand mixture tends to lose its bond and disintegrates. The development of this green sand method of making a casting gave a great impetus to the business, both on account of reduced cost and a smaller investment required in plant and equipment.

Overcoming Inherent Difficulties

This matter of getting a proper molding mixture was the great difficulty confronting the early manufacturers of steel castings. On account of the length of time it takes to pour an ordinary ladle of steel into castings, and because also many castings have thin sections, it is necessary to have a metal temperature at the time the heat is tapped of about 2800 deg. Fahr. The melting point of silica sand is about 3200 deg. Fahr., so that the margin between the temperature of the steel and the melting point of the mold is rather narrow. As a matter of comparison, the pouring temperature of gray iron is from 2200 to 2300 deg. Fahr., and of malleable iron from 2300 to 2400 deg., which is well below the melting point of the mold, and the sand is not seriously injured; whereas, in a steel foundry the facing sand, so-called, which comes in contact with the hot metal a few times is practically destroyed, and can thereafter be used only for backing. If a good surface is required for castings, care must be taken in every case to see that new sand only is used where it comes in contact with the metal. In green sand work about 1500 lb. of new sand is required per ton of castings, and in dry sand the average is a ton of sand to a ton of castings.

The next great difficulty which confronted the manufacturer of steel castings was to avoid shrinkage cracks. The contraction of cast steel is about seven thirty-seconds of an inch per foot—practically double that of cast iron. To get an idea of what this means, a locomotive frame 34 ft. long, for instance, will shrink or contract 6 or 7 in. in length in cooling from a liquid to a solid state, and provision, of course, must be made to allow this contraction to take place. A long, slender section of a casting, with flanges or projections at both ends, will invariably crack, and in extreme cases pull itself apart, unless the holding power of the mold against these flanges or projections is removed in time. It is important in the designing of steel castings to avoid, wherever possible, such a condition as this. It is equally important to avoid a sudden change from a heavy to a light section.

Another great difficulty with the proper production of steel castings is the avoidance of pipes and shrinkage cavities. This can be done only by the use of risers or shrink heads of sufficient size and number and properly located. In extreme cases the weight of metal in these risers—which must, of course, be cut off—equals the weight of the casting itself, and the average of net production of castings probably is not over 65 per cent

of the metal charged. In green sand work, where the sections are thin and heavy risers not used, the yield may in some cases run somewhat over 75 per cent. The cost of cutting off these risers, and the fact that to produce a ton of castings requires from 1.5 to 2 tons of metal, is a very large item in the cost of steel castings. Not infrequently these risers are necessarily located on a casting at points extremely difficult to reach with a cutting tool. In the last few years the use of gas cutting torches has greatly facilitated this work.

Another difficulty which has long been hard to overcome, the one which perhaps more than any other has been the cause of a good deal of the unfortunate reputation steel castings had in the earlier stages of the development of the business, was porosity. There are many causes for this condition, among the principal of which are: Improper composition of metal, wet sand, too much carbonaceous material in sand mixture, poorly ventilated cores, too rapid filling of the mold, improper gating. The truth is that the proper making of a steel casting calls for the co-ordination of a good many elements and compositions; if any one is imperfect, the effect is sure to be seen in the casting. And the difficulty is that in the handling of certain of these elements no rules can be laid down which will satisfactorily guide an inexperienced man. Skill based on long experience is the only apparently sure guide. Of course, the metal itself, up to the time it reaches the mold, is susceptible of pretty exact manipulation, but for the proper method of molding, and the location of gates and risers, there are apparently no rules that can be laid down.

Then, after the casting is all but finished, it must be annealed to relieve possible internal strains due to irregular shrinkage in the casting itself, and the different rates of cooling due to variations of sections, etc. There has been a great deal of difference of opinion on this matter of annealing. Some makers have gone so far as to claim that it was not necessary. A paper could be written on this subject alone. Our experience is that annealing is necessary; certainly it is in the direction of safety. The proper annealing temperature depends upon the carbon contents of the casting, and ranges from about 1300 to 1500 deg. Fahr. for carbons from 0.20 to 0.90. The only certain method of determining whether a casting has been properly annealed is by a microscopic examination of a test piece broken from the casting. The time taken in bringing the casting up to the proper temperature and the rate of cooling are both important factors in the final result.

The past history of the industry has been about the same as that of most industries. The early experimental and development stage was difficult and un-



Large Cast-Steel Housing for the Large Plate Mill of the Lukens Steel Company, Coatesville, Pa. Its weight in its present condition is 24,045 lb.

profitable. In course of time a few successful businesses were developed and made money. After that there was apparently a too rapid expansion of capacity, excessive competition and no profit. Then followed the usual dropping out of the weak and the building up of the strong companies. During recent years, when general business conditions have been good, I think the industry as a whole has shown a fair margin of profit. Following policies and methods suggested and practiced by this Institute, the larger companies have been more inclined to work on a "live and let live" basis. We have been exchanging information as to methods, comparing costs, and undertaking in certain directions to adopt standard designs and specifications, all with the idea that by improving our methods and reducing our costs, we will broaden the field of the industry and make more work for us all.

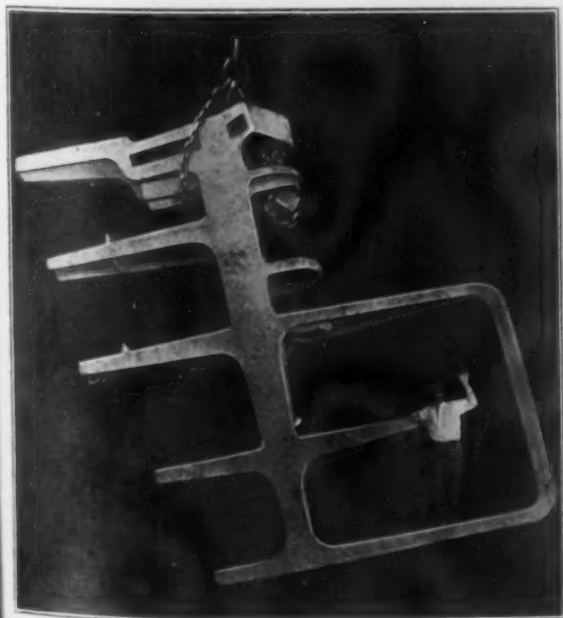
Cost-Finding Plan for Gray-Iron Foundries

Details of a cost-finding plan for gray-iron foundries are presented in Bulletin No. 5, issued by the committee on foundry methods of the National Founders' Association, 29 South La Salle Street, Chicago. The bulletin supplements the general plan outlined in an earlier one. A brief general discussion of the subject of cost finding and the best methods to use is presented, followed by a table of the various sub-divisions to which all the time and labor items are to be charged. A table showing an estimate based on the plan outlined in the bulletin is given. Some 13 forms are used in connection with the plan for securing the information required. These forms, which the service bureau of the association is prepared to furnish in any quantity to members, are full size and are bound in the bulletin as an insert.

Six essential points are emphasized, it being brought out that the plan is not a complicated system, but a straightforward case of accurate arithmetic. With this in view, the bulletin has been confined strictly to the explanations of such fundamentals, sub-divisions and forms as are necessary to enable the member to arrive at proved costs, and thus help him get after the points in the production system where the largest leaks occur.

World's Platinum Output in 1916

The world's platinum output in 1916 is reported by James M. Hill of the U. S. Geological Survey as only 83,670 oz. troy, against 143,145 oz. in 1915 and 313,529 oz. in 1912, the largest output in the last eight years. Russia has hitherto furnished about 95 per cent of the total, and Colombia has stood second. Of the 1916 output, Russia is credited with 57,860 oz., and Colombia with 25,000 oz. The United States produced only 750 oz. last year, which, however, is its largest output in eight years. An abnormal situation now exists, says Mr. Hill, because the supply is very low, and prices very high, and it should be considered what steps are to be taken to assure an adequate stock of platinum for the essential uses of the Government.



Another Modern Large Steel Casting—Rudder Frame for the Battleship Mississippi, Weighing 50,500 lb.

Machinery Markets and News of the Works

DELAY HALTS BUSINESS

Government Slow to Enter Market

Round-lot Orders Lacking—Price Advances Continue—Foundry Capacity Grows—Foreign Trade Shows Improvement

The delay in placing Government contracts for war supplies, which has extended beyond the time estimated necessary, has caused a halt in the machine-tool business everywhere. In addition the slow but steady extension of delivery on those lines most needed and further price increases have also operated to keep some purchasers out of the market. Orders for one or two tools constitute the bulk of demand.

Foreign business has become rather more active. A complete shipyard shop is wanted for France, including 50 plate-working tools worth about \$200,000. A South American lumber company has bought an entire machine-shop equipment. England has ordered lots of 18 automatics and 25 turret lathes. The Guggenheim interests are reported in the market for large requirements in power, hoisting and other equipment.

Price advances are appearing with striking regularity. Nearly all kinds of tools have been increased at Cincinnati. Drill presses have been advanced at New York 12½ per cent and some other lines about 10 per cent. The National-Acme Company raised its quotations on automatic screw machines 10 to 12 per cent, May 22, to meet the growing costs of castings, labor, etc.

Few new machine-tool plant enlargements have been recently recorded, although a number are under construction. The entire skilled shop labor of the country is fully employed, and with plants operating to the limit, little hope is found for any betterment in deliveries. With the placing of war orders a further postponement of shipping dates is expected.

Foundries are in the same crowded condition as machine shops. Capacity is being increased continually and in the Milwaukee district is on an unprecedented scale.

The call for traveling cranes is heavy, especially for 1, 2 and 3-ton sizes, and comes from the entire industrial field.

New York

NEW YORK, N. Y., May 29, 1917.

In the attempt to get prospective machine-tool needs before the trade, new equipment which is absolutely essential to the rapid production of war supplies, first one line of machinery and then another is flooded with inquiries. Government work is the slogan by which prospective buyers hope to get preference over other demand; but the authorities at Washington still move with exasperating slowness and few of these many large inquiries have consequently developed into actual business for machinery builders. Delays are having a quieting effect on the entire trade.

While dealers fret at the postponement of purchases, shopmen work desperately to relieve their already overloaded plants. This is the only way, except by training manufacturers of other less essential machinery, in which machine-tool output can be increased to meet pending war demands.

The inability to get any more skilled mechanics places an absolute limitation on plant expansion. In some large sections where many large plants are close together irresponsible mechanics float from one shop to another so that many superintendents are not getting on the average over 50 per cent shop efficiency.

No price advances are reported on lathes, but on drill presses increases of 12½ per cent have been made immediately effective. Other advances in miscellaneous lines average about 10 per cent. Punching and shearing machinery quotations are now at a big premium over list. Deliveries in general are no better; in some lines they are falling further behind, notably for punching and shearing tools, which have now reached the same condition that standard lathes, milling machines, etc., have been in for some time, so that buyers are beginning to canvass the second-hand market for quick deliveries.

The domestic market shows no great changes. The impetus for the moment is for shipbuilding machinery from yards that will rush the construction of steel ships. Some big inquiries have appeared very recently and a rather slack business for the past two weeks in this line bids fair to give way to a good lot of orders. Some have already appeared. The Terry & Tench Company, Grand Central Terminal, New York, has purchased 12 punches and shears for a yard which it will establish adjoining that under construction by the Foundation Company on the Ford track in Newark Bay. It is also in the market for a lot more of the same tools, including three plate-bending rolls, plate presses, etc. An inquiry from France is for a complete shipyard shop, including 50 plate-working tools worth over \$200,000. Lathes over 30 in. in size are hard to get. Cylindrical grinding machinery is not in as strong demand and deliveries can now be had in 2 months as against 5 months awhile back.

Demand for traveling cranes holds strong. J. K. McGowan, 120 Broadway, New York, purchasing agent for the Guggenheim interests, is in the market for a lot of cranes, hoists, and other equipment. The Baltimore Dry Dock & Shipbuilding Company is buying about 15 cranes of 15-ton capacity and smaller. A large aggregate of business is being done in 1, 2 and 3-ton cranes coming in small lots and single orders from the entire industrial field. Orders for the larger sizes continue to filter in from steel plants and other large works.

The plant of A. J. Hastings & Co., 41-49 Commercial Street, Newark, N. J., is operating at full capacity in the manufacture of saws. The present production is about 100 circular saws per day, as well as other types in quantity. It is planned to increase the output when additional skilled labor can be obtained.

The Pittsfield Machine & Tool Company, East Orange, N. J., has been incorporated to manufacture machinery and tools. Harry H. Picking, Charles O. Geyer and Gordon Grand are the incorporators.

The American File Sharpening Company, 37 Monroe Place, Bloomfield, N. J., has filed notice of organization to operate a local plant. Bernard Werbel is president.

George G. Gate, Yonkers, N. Y., and associates, have incorporated in Delaware the Eastern Aniline & Chemical Company, with capital of \$2,000,000 to manufacture chemicals, etc. Other incorporators are Clark L. Jordan, Jr., and George F. Baright, New York City.

The Deussenburg Motors Corporation, recently formed with paid-in capital of \$1,000,000 to take over the Loew Victor Engine Company of Chicago and the Deussenburg Motors Company of St. Paul, has purchased a 10-acre tract of land at Newark and North Avenues, Elizabeth, N. J., and will rush to completion a factory which will give employment to over 1000 hands. Edward P. Decker, vice-president, announces that the company will manufacture the highest powered aeroplane and motor boat engines that have ever been built here or abroad.

The Art Brass Company, 299 East 134th Street, New York, has increased its capital from \$3,000 to \$30,000 for expansion.

Cutting & Washington, Inc., New York, have been incorporated with an active capital of \$110,000 to manufacture machinery to be used in message transmission. The incorporators are F., R. and B. Cutting, 2 Nassau Street.

The Magna Machine Company, Brooklyn, N. Y., has been incorporated with capital stock of \$100,000 to manufacture

turret tool posts. C. F. Splittdorf, G. H. Murphy and H. Newmann, 555 Driggs Avenue, Brooklyn, are the incorporators.

The Stromberg-Carlson Telephone Mfg. Company, University Avenue, Rochester, N. Y., manufacturer of inter-office telephone equipment, etc., has recently increased its capital stock from \$450,000 to \$1,000,000.

The Williams Steel Wheel & Rim Company, Utica, N. Y., has been incorporated with capital stock of \$50,000 to manufacture wheels and automobile parts. C. B. and H. D. Williams and C. F. Menge, Utica, are the incorporators.

The Public Service Electric Company, Terminal Building, Newark, N. J., is preparing plans for the erection of an addition to its Essex power plant at Point-No-Point, to cost \$365,000. N. A. Carle is chief engineer.

The Upson-Walton Company, Newark, N. J., manufacturer of wire rope and cables, will build a one-story plant extension, 45 x 54 ft., at 462 Riverside Avenue, to cost about \$4,000.

Force & Steel, Inc., Newark, N. J., have been incorporated with a capital of \$20,000 to manufacture metal products. William H. Force, Alexander N. Steel, Newark, and Nelson R. Horsley, Springfield, Mass., are the incorporators.

The Fritts-Gilbert Refrigerator Company, Newark, N. J., has been incorporated with a capital of \$125,000 to manufacture refrigerators. W. Eugene Turton, 810 Broad Street, atwood T. Fritts and Maurice B. Gilbert are the incorporators.

The New Jersey Brass Corporation, Garfield, N. J., has been incorporated with a capital of \$100,000 to manufacture brass goods. C. E. Sanders is the local representative.

The proposed addition to the plant of the Keuffel & Esser Company, 300 Adams Street, Hoboken, N. J., will be four-stories, instead of five, as recently announced. Plans for the structure have been filed and a permit issued for erection. The building will be located at 305-7 Jefferson Street, consisting of the addition of four stories to an existing two-story plant. The company is manufacturing periscopes and kindred instruments for the Government, as well as its regular line of engineering instruments.

The Fred L. Atherton Machine Company, 17 Market Street, Paterson, N. J., manufacturer of textile machinery, will build a four-story, brick and concrete plant at Mill Street and McBride Avenue, at a cost of about \$50,000. E. R. Coe, Romaine Building, Paterson, is the architect.

The David M. Rorer Aviation Company, Asbury Park, N. J., has been incorporated with capital stock of \$125,000 to manufacture aeroplanes, etc. David M. Rorer, Cassville; M. E. Adler and L. E. Schank, Asbury Park, are the incorporators.

The Spicer Mfg. Company, 308 West Fourth Street, Plainfield, N. J., manufacturer of universal joints, will build an addition to its plant.

The Stewart Motor Corporation, Superior Avenue, Buffalo, N. Y., specializing in the assembling of motors, has increased its capital from \$325,000 to \$1,000,000 for proposed expansion.

The Keiner-Williams Stamping Company, 652 Vine Street, Richmond Hill, N. Y., manufacturer of drawn and stamped sheet metal, ice cream and milk cans, has filed plans for a brick addition, 98 x 153 ft., to cost about \$20,000. W. W. McEwen is secretary.

The Moline Seal Lock Company, Troy, N. Y., has been organized with a capital of \$25,000 to manufacture locks and metal seals. C. F. Jordan, T. P. Huxtable and C. S. Brintnall are the incorporators.

The DeLaval Separator Company, Poughkeepsie, N. Y., has let contracts for an addition 40 x 100 ft.

The Atlas Crucible Steel Company, Dunkirk, N. Y., has let contracts for the erection and equipment of a producer gas building. It is also completing additions to its rolling mill, hammer shop and melting department.

The Curtiss Aeroplane Company, Buffalo, is building an extension to its machine shop at Hammondsport, N. Y.

The Continental Air Craft Company, 120 Liberty Street, New York, will build a one-story aeroplane factory, 70 x 120 ft., at Amityville, Long Island, N. Y.

The Fan-flame Spark Plug Company, Yonkers, N. Y., has been chartered with capital stock of \$15,000 to manufacture automobile accessories. The directors are B. B. Tottingham, J. H. and J. G. Gill.

James & Hawkins, Inc., Jamaica, N. Y., have taken out incorporation papers to manufacture hardware, builders supplies, etc. The capital stock is \$100,000. P. B. James, 73 Union Hall Street; A. S. Downs, Jamaica, and N. W. Hansman, Glen Cove, N. Y., are the incorporators.

The Hughes Mfg. Company, Rome, N. Y., has been incorporated with a capital stock of \$50,000 by S. B. Stevens, F. M. Potter, Jr., and G. W. Turney to manufacture hooks, eyes, wire, etc.

The Palmer-Simpson Corporation, Saranac Lake, N. Y., has filed articles of incorporation to manufacture hydroplanes,

launches, etc. The directors are C. S. Palmer, D. S. Simpson and M. J. Corey.

The E. N. L. Airplane Company, Buffalo, has been chartered with a capitalization of \$250,000 to manufacture aeroplanes, engines, etc., and will establish a plant. F. Eggenan, A. Nelson, 614 Fidelity Building, and J. J. Diebold are the incorporators.

The Hauser Machine & Mfg. Company, Rochester, N. Y., has filed articles of incorporation with a capitalization of \$50,000 to manufacture machinery. J. and W. E. Hauser and G. J. Dash, Rochester, are the incorporators.

New England

BOSTON, MASS., May 26, 1917.

No inquiry of large size has been reported this week, but there has been no slackening in the large volume of orders for single machines. Orders based on Government contracts are still marking time, and the direct Government orders that have been pending have not been placed, according to report. Machine-tool manufacturers are hopeful that the tedious unwinding of red tape which has for so long marked Government business will be accelerated, but recurring troubles with inspections and departmental methods continue to call for a large measure of patience.

Makers of radio equipment and aeroplane engines have been showing considerable activity, and several scattered inquiries are in the market, and some orders have been placed the past week. One inquiry in the Boston market has been for an entire machine-shop equipment to go to a large lumbering concern in Central America.

The recent auction sale of the equipment of the F. S. Perkins Company, lathe manufacturer, Lowell, Mass., showed that there is a good demand for second-hand tools, and some rather old machine tools brought exceedingly high prices. It is reported that the best of the lot was bought in by parties interested in the reorganization of the company.

The Colt's Patent Fire Arms Company, Hartford, Conn., has awarded a contract for a factory building, 100 x 100 ft., one story.

The Bridgeport Gun Tool Company, Bridgeport, Conn., has been incorporated with authorized capital stock of \$25,000, to manufacture tools and machinery. The directors are J. G. Woodbury, president; Fred E. Lacy, secretary and treasurer; and William B. Boardman.

The Hartford Iron Works, Hartford, Conn., has re-elected W. A. Clinton, president and treasurer, and has elected George W. King, assistant treasurer of the American Bank & Trust Company, vice-president, to succeed E. J. Manning, and H. W. Storrs, secretary.

The Hartford Electric Steel Corporation of Rocky Hill, Rocky Hill, Conn., has been incorporated with authorized capital stock of \$150,000 by William R. Palmer, Bridgeport, and Harry S. Blumenthal and Michael Suisman, Hartford. Suisman and Blumenthal recently bought the Dividend plant at Rocky Hill of the Billings & Spencer Company, Hartford, Conn.

The Hendey Machine Company, Torrington, Conn., has awarded a contract for an addition, 60 x 160 ft., one story.

The Merchant Submarine Company has been incorporated at Augusta, Me., with authorized capital of \$10,000,000. It is reported that it purposes to build large merchant submarines after designs by Simon Lake of the Lake Torpedo Boat Company, Bridgeport, Conn.

The Langeller Mfg. Company, Providence, R. I., has awarded a contract for an addition, 133 x 191 ft., one and two stories.

The Morgan Spring Company, Worcester, Mass., has received bids for an addition, 68 x 200 ft., three stories.

The Spring Perch Company, Bridgeport, Conn., has awarded a contract for the foundations of a factory, 132 x 360 ft., one story, to be built in Stratford, Conn.

The Chase Rolling Mill Company, Waterbury, Conn., has awarded a contract for a temporary storage building, 25 x 150 ft., one story.

The Bridgeport Chain Company, Bridgeport, Conn., has awarded a contract for an addition, 40 x 100 ft., two stories.

The Waterbury Mfg. Company, Waterbury, Conn., is contemplating the erection of a six-story addition, and is demolishing buildings now on the site.

The New London Ship & Engine Company, Groton, Conn., is to build an addition, 41 x 75 ft., three stories, to its office building. The company has awarded a contract for an addition, 110 x 125 ft.

The General Ordnance Company of Connecticut, Groton, Conn., has been incorporated with authorized capital stock of \$3,000,000 to manufacture munitions and war equipment.

The officers are G. C. Davison, president; F. L. Brake, treasurer; and W. D. Fessler, secretary. The new corporation will take over the business of the General Ordnance Company of Delaware, which was incorporated with capital stock of \$700,000 at the beginning of the war, and has been operating the former plant of the Driggs-Seabury Company at Derby, Conn. The company is a large manufacturer of nonrecoil aeroplane guns, and is now also making naval rifles for patrol boats and destroyers. Experimental work on torpedoes is also being carried on, it is reported.

Fourteen frame buildings forming part of the plant of the P. & F. Corbin division of the American Hardware Corporation, New Britain, Conn., were destroyed by fire May 21. These were used principally for foundry purposes, carpenter shops, machine storage and smelting. The total loss was about \$75,000.

The Crompton & Knowles Loom Works, Worcester, Mass., has been authorized to increase its capital stock from \$3,000,000 to \$6,000,000.

The United States Government contemplates several additions to the Watertown Arsenal, Watertown, Mass. These include an extension to the office building, a building for the planning and inspection forces, a two-story storehouse, two sets of officers' quarters, and other new construction.

The Connecticut Steel Corporation, Bridgeport, Conn., has been incorporated with authorized capital stock of \$20,000 by William S. Lane and Arnold W. Knauth of New York, and Cornelius C. Webster of Brooklyn, N. Y.

The General Electric Company is to build two additions, each 75 x 150 ft., three stories, at its Pittsfield, Mass., plant.

The Hyde Mfg. Company, cutlery, Southbridge, Mass., has awarded a contract for the erection of six manufacturing buildings.

The Eagle Pocket Knife Company, New Haven, Conn., has filed a certificate of organization with paid-in capital of \$12,000. O. L. Hemming is president and treasurer; E. J. Boyler, vice-president; and S. F. Beck, secretary.

The Potter & Johnston Mfg. Company, Pawtucket, R. I., has awarded a contract for an addition to cost \$50,000.

An explosion in the welding department of the Auto Metal Body Company, Springfield, Mass., which killed one operative and seriously injured another, was followed by a fire which caused damage estimated at \$20,000.

The Brown & Sharpe Mfg. Company, Providence, R. I., has awarded a contract for an addition, 50 x 100 ft., three stories.

The Travers Mfg. Company, East Templeton, Mass., successor to the Wheeler Mfg. Company, is in the market for a sprinkler system and a lumber drying kiln.

Philadelphia

PHILADELPHIA, Pa., May 28, 1917.

The Cann & Saul Steel Company, 516 Commerce Street, Philadelphia, manufacturer of steel forgings, has about completed improvements and additions to its forge and machine shops at Roversford, Pa., costing \$50,000, and has added a new structural steel building, 55 x 135 ft., together with traveling cranes, new hammers, lathes, and other machine tools to the machine shop equipment, and a new boiler house for 500 hp. capacity.

The proposed shipbuilding plant of the New Jersey Shipbuilding Company, Gloucester City, N. J., will be devoted to the manufacture of standard type merchant vessels. The company's property, recently acquired, consists of about 125 acres, with frontage on the Delaware River; the works will have a capacity for constructing 10 vessels a year of 4000 tons and over. The company, incorporated recently with capital of \$1,000,000, is affiliated with the Pennsylvania Shipbuilding Company, with plant at Gloucester City, adjoining the proposed new works, and headquarters in the Land Title Building, Philadelphia. The same interests also operate the Pusey & Jones Corporation, Wilmington, Del. H. E. Norbom is one of the operating heads of the company.

The Abrasive Material Company, James and Fraley streets, Philadelphia, manufacturer of emery wheels, etc., has filed plans for an addition to cost \$13,000.

The Berko Brothers Company, Randolph and Wood streets, Philadelphia, manufacturer of structural steel shapes, will build a two-story brick and concrete plant, 150 x 200 ft., at York Road and Erie Avenue.

The American Insulation Company, Philadelphia, recently incorporated with capital stock of \$100,000, has awarded a contract for a two-story brick and concrete building, 85 x 130 ft., at Stokley Street and Roberts Avenue. B. T. Conwell, Jr., is president.

The Otto Gas Engine Works, Philadelphia, operating ma-

chine repair shops at Thirty-third and Walnut streets, and also specializing in the manufacture of gas and gasoline engines, is being reorganized under the name of the Otto Engine Works. The directors of the new company are J. W. McWilliams, Jacob Leffman and George B. Walker. George W. Evanson is secretary of the company. It is understood that the capitalization of the company will be increased for expansion. Papers have recently been filed conveying the property now occupied, with assessed valuation of \$110,000, to W. R. Stanert.

The American Metal Company, Stenton Avenue, Germantown, Philadelphia, has awarded a contract for a two-story brick and concrete addition, 60 x 325 ft.

A new power plant, 100 x 250 ft., will be erected by the Bureau of Yards and Docks, Navy Department, Washington. Bids for construction are now being taken. The bureau will also erect a similar power house at Norfolk, Va. F. R. Harris, New York Avenue, Washington, chief of the bureau.

The L. H. Gilmer Company, 52 North Seventh Street, Philadelphia, manufacturer of belting, is having plans prepared for a three-story brick addition, 60 x 153 ft. H. C. Eisenbise, Philadelphia, is the architect.

The Sun Shipbuilding Company, Chester, Pa., is taking bids for a one-story addition to its plant, 50 x 110 ft.

The Bond Foundry & Machine Company, Penn and Railroad streets, Manheim, Pa., manufacturer of bearings, pulleys, etc., has commenced the erection of an addition.

The National Casting Company, Marietta, Pa., recently organized, has acquired the property formerly used by the Marietta Mfg. Company to manufacture iron and steel castings.

George W. McIlhenny and D. A. Caley, Harrisburg, Pa., have incorporated in Delaware the Keystone Industrial Corporation, with capital stock of \$1,500,000, to manufacture boilers, engines, etc.

The Bethlehem Steel Company, South Bethlehem, Pa., has taken bids for a one-story reinforced-concrete copper shop, 60 x 120 ft., at its plant at Sparrows Point, Md.

The Carbo-Hydrogen Company, Pittsburgh, Pa., manufacturer of blow pipes and pressure regulators, has been incorporated with capital stock of \$3,500,000. J. C. Trees, 1452 North Highland Avenue, Pittsburgh, is president. It has also filed notice of intention to operate in Chicago, with a local capital of \$654,000.

Samuel K. Reeves has established a new stove foundry at 228 Hayes Avenue, Camden, N. J.

Baltimore

BALTIMORE, Md., May 28, 1917.

The Shawinigan Electro Products Company, 1605 Lexington Street Building, Baltimore, has increased its capital stock from \$250,000 to \$500,000.

The Frederick Iron & Steel Company, Frederick, Md., has been incorporated with \$150,000 capital stock, to deal in iron, steel, brass, copper and other metals. The incorporators are William A. Riddell, George M. Gittinger and Claude S. Hahn.

The Crown Smelting Company, Concord Avenue, near Fifth Street, Chester, Pa., is having an addition built. It is nearing completion.

A two-story machine shop being built for Joseph Harper, Chester, Pa., is almost completed.

Fire on May 24 damaged the building contents of Dobos & Schlutter, Inc., 509-513 South Eden Street, Baltimore, structural iron and steel manufacturer.

The Dugan Machinery Company of Baltimore City, 123 South Street, Baltimore, has been incorporated with \$25,000 capital stock by John I. Lewis, Frank P. Stack and William T. Hayden.

The Baltimore Tube Company, Wicomico and Ostend Streets, Baltimore, has awarded a contract for a one-story, 37 x 100-ft. casting shop to cost about \$12,000 to the West Construction Company, American Building.

The Alma Mfg. Company, 611 South Monroe Street, Baltimore, manufacturer of buckles and buttons, will build a one-story, 24 x 26-ft. addition, to cost about \$1,200.

The Old Dominion Pig Iron Company, Roanoke, Va., is considering the construction of additional buildings.

Final plans for the construction of a shipbuilding plant by the Baltimore Dry Docks & Shipbuilding Company, Baltimore, Md., were gone over by President Holden A. Evans and other officials in Baltimore, and by five of the directors of the company who visited that city last week. The company has contracted with the government for the construction of two mine sweepers.

The Maryland Shipbuilding Company, Lexington Building, Baltimore, Md., is planning for the erection of a ship-

building plant at Bear Creek. Bids for construction will soon be called. It is reported that the plant will cost about \$150,000. Charles E. F. Clark is president.

The Electric Hose & Rubber Company, Wilmington, Del., has completed the erection of a new machine shop. Work is now under way on improvements and extensions to other plant structures.

The Washington Steel & Ordnance Company, Giesboro Point, near Washington, D. C., will build a new two-story brick and steel power house addition to cost about \$59,000.

The York River Shipbuilding Corporation, Port Richmond, Va., recently organized with a capital of \$1,000,000, is planning the erection of a shipbuilding plant on the Mattaponi River. Adolph Shelinder and E. E. Baker, naval architects, Richmond, are preparing preliminary plans. Warner Moore is president and Oliver J. Sands, Richmond Va., is treasurer.

Chicago

CHICAGO, ILL., May 28, 1917.

Without unusual features, the local machinery market continues to pursue a satisfactory trend. The absence of large buying, in view of difficult and extended deliveries, is offset by numerous inquiries and orders for one or two machines required in many directions. The Santa Fe has made known its requirement of a few additional tools, including one 18-in. x 12-ft. belt-driven engine lathe; one 36-in. belt-driven engine lathe; one 5-ft. belt-driven radial drill; one 4½-ft. belt-driven radial drill, and one cutting-off saw.

A goodly representation of Chicago dealers went to the meeting of the National Machine Tool Builders' Association at Cincinnati last week, and all returned declaring that the convention was one of the most fruitful they ever attended.

The United States Can Company of Cincinnati has purchased five acres in the West Side manufacturing district of Chicago, and work will begin at once on a one-story building containing about 50,000 sq. ft. to cost about \$90,000. It is understood that the first building is the initial unit of a plant to cost \$300,000.

The R. B. Hayward Company, manufacturer of ventilating apparatus, has leased a one-story building at 849 and 853 Ohio Street, Chicago, which is to be ready for occupancy about July 1.

The Enterprise Machine Company, Minneapolis, Minn., has been purchased by a group of St. Paul business men, and it is reported that the first unit of a large factory will be erected in St. Paul. C. A. Follitt heads the purchasers. The company manufactures internal combustion engines.

The Sundstrand Mfg. Company, Rockford, Ill., has been incorporated with a capital stock of \$25,000, to manufacture machinery and machine tools. The incorporators are Gustaf D. Sundstrand, G. Adolph Sundstrand and Oscar J. Sundstrand.

The Keystone Steel & Wire Company, Peoria, Ill., which has just recently completed two open-hearth furnaces, is having plans prepared for an additional furnace, the contract for which will be awarded at the earliest possible moment.

The Bear Mfg. Company of Wilmington, Del., manufacturer of automobile starters, has been incorporated with a capital of \$200,000 to do business in Illinois. It has taken over the Sandbo Starter Company of Rock Island, Ill., and will locate its plant in that city.

The Fulton-Alden Company, Waukegan, Ill., manufacturer of phonographs, will enlarge its factory building and completely equip the plant with a series of improved electric motors.

The Reynolds Engineering Company, Moline, Ill., has been incorporated with a capital stock of \$15,000, to manufacture machinery, tools and engines. The incorporators are J. P. Reynolds, C. P. Lowery, Kenneth D. Pilton and Harold Brown.

W. H. Hibbard, care of the L. I. Conrad Company, 175 West Jackson Boulevard, Chicago, desires to get in touch with manufacturers of munitions with a view to manufacturing automatic aero time bombs.

J. T. Bunting, J. G. Burns and C. W. Shaeffer, all of Chicago, have incorporated in Delaware the Bunting Boiler Company with capital of \$300,000, to manufacture boilers, steam fittings, and kindred specialties.

Charles Wilde and Frank A. Hilfinger, Chicago, have incorporated in Delaware the Marine Safety Appliance Corporation, with a capital of \$1,000,000 to manufacture ship-floating devices.

A. N. Jarvis and Samuel McK. Dane, Chicago, have incorporated in Delaware the Politowski Magnetic Engine Company with capital of \$1,000,000 to manufacture electrical machinery.

Milwaukee

MILWAUKEE, WIS., May 28, 1917.

Although a disinclination to undertake further shop extensions, because of the shortage and high price of materials and labor, has been apparent for some time, several important projects have recently been put under way, due to the extreme urgency of enlarged facilities. For the most part, new construction has been based very definitely upon the ability of machine-tool builders to furnish equipment, and disappointments resulting from the extremely sold-up condition of tool works and consequent delays in making deliveries is the limiting factor. Until Government specifications are released, tool builders in this district are working at fever heat to get as much private work out of the way as possible. There has been no sign of a falling off in the demand, which, however, shows no large-lot requirements, and is confined almost wholly to single tools or small lots. Well-informed tool men say that they have noted very little, if any, difference in the volume or sources of demand within the last 8 to 12 months, even since the declaration of war was made. Foundry capacity in this district is being increased on an almost unprecedented scale, and the sixth large electric steel enterprise is now being established here. Founders, who made installations of electric furnaces within the last year or 18 months, have found them so successful that the original installations in every instance are being duplicated or enlarged to an even greater extent.

The Manitowoc Ship Building Company, Manitowoc, Wis., has awarded contract for a one-story shop addition, 80 x 140 ft., of steel and galvanized iron, to the Wisconsin Bridge & Iron Company, North Milwaukee, Wis.

The Four Wheel Tractor Company, Clintonville, Wis., will have plans prepared for the first unit of its proposed new tractor plant, to be 100 x 150 ft., and cost about \$50,000 complete. A. B. Mayhew is secretary.

The board of education, Antigo, Wis., has awarded contract to the Immel Construction Company, Fond du Lac, Wis., for an addition to the high school for a manual training institute, to cost \$10,000.

The Wisconsin Bridge & Iron Company, Milwaukee, has moved its offices from 605-607 Colby-Abbot Building, Milwaukee, to its works in North Milwaukee.

The Damrow Brothers Company, 39 Third Street, Fond du Lac, Wis., tin and sheet metal products, has awarded contracts for a two-story brick and concrete building, 80 x 100 ft., on Western Avenue and Brooke Street. It is to be ready about Sept. 1. Equipment is now being purchased.

The Milwaukee Woven Wire Works, 3014-3020 Clarke Street, Milwaukee, has increased its capital stock from \$50,000 to \$200,000 to finance proposed extensions. No new construction will be undertaken at this time. O. H. Stuewe is secretary.

The Seymour Electric Company, Seymour, Wis., has been incorporated with a capital stock of \$10,000 to construct and operate an electric light and power plant. The incorporators are W. E. Daniels, S. D. Newell and E. P. Daniels.

The Albrecht Mfg. Company, Kewaunee, Wis., manufacturing cheese boxes, etc., will erect a boiler house, to contain an 80-hp. boiler.

The Ettrick & Northern Railroad Company, Ettrick, Wis., has been granted permission to issue \$50,000 in construction and equipment bonds to complete the first unit of its steam railway, now under construction. It is intended to start operation of trains by Sept. 1.

The Illinois Metals Company, Huron, S. D., organized to operate in the southwestern Wisconsin lead and zinc district, has been granted a charter in Wisconsin. The capital stock is \$43,000. R. R. Stafford, Cuba City, is Wisconsin representative.

The F. R. Dengel Mfg. Company, 338-346 Fourth Street, Milwaukee, plumbers' and steamfitters' supplies, has amended its corporate articles to provide for an increase of the capital stock from \$150,000 to \$250,000. Frank R. Dengel is president.

The Board of Education, Stevens Point, Wis., has selected the firm of Robert A. Messmer & Bro., architects, 1004 Majestic Building, Milwaukee, to prepare plans for a \$75,000 addition to the high school and manual training building.

The American Brass Company, Kenosha, Wis., has acquired a tract of nearly 7 acres adjoining its Kenosha works, to provide for future extensions. Leases on three existing factories on the tract will not expire until May 15, 1918, and no new work will be undertaken until that time at least.

The Standard Oil Company (Indiana) has awarded the general contract to The Raulf Company, 53 Patton Building,

Milwaukee, for the erection of a two-story fireproof machine shop and private garage, 90 x 140 ft., at Barclay and Walker Streets, Milwaukee. W. W. Nicholas, 614 Germania Building, is manager at Milwaukee.

The LaCrosse Tractor Company, LaCrosse, Wis., has purchased about three-fourths of the block at Loomis and Clinton Streets, in that city, and it is intimated that extensions to the plant will be made some time this year, but details have not been divulged.

Otto Biefeld & Co., Watertown, Wis., operating boiler, structural and machine shops, has purchased a site, 100 x 300 ft., adjoining the present works, and intends to erect a foundry and a shop addition costing about \$30,000 with equipment. Plans have not been prepared as yet.

The Pelton Steel Company, Milwaukee, has installed a 3000-lb. Snyder electric furnace, duplicating an original installation of this equipment, and took off its first heat on May 26. The present schedule of 5 heats daily is being increased to 7 heats, using the two furnaces alternately. T. H. Harvey is general manager.

The Menominee Motor Truck Company, Menominee, Mich., has definitely decided to remain in that city permanently and is preparing to enlarge the present works. The company received a proposition to relocate in Green Bay, Wis., but this has been rejected, as sufficient additional capital has been subscribed locally to insure needed enlargement of facilities.

Referring to reports that the Milwaukee Electric Railway & Light Company is directly interested in the Valley Steel Company, now establishing an electric steel foundry and merchant bar and billet at St. Francis, a suburb of Milwaukee, S. B. Way, vice-president and general manager, Electric company, in an interview stated that the interest of his company is limited to the sale of power to the new industrial enterprise. The Valley Steel Company will make steel by the electric process, and becomes the sixth electric steel furnace enterprise situated in Milwaukee and suburbs, and the third on the lines of the Electric company. The main structure will be 85 x 680 ft.

The LeROI Company, Milwaukee, gasoline engines and automobile motors, has started erection of a one-story machine shop addition, 80 x 170 ft., at Sixtieth Avenue and Mitchell Street, West Allis. It will be of brick, concrete and steel, with saw-tooth roof. Charles W. Pendock is general manager.

The Oshkosh Savings & Trust Company, as receiver of the Termaat & Monahan Company, Oshkosh, Wis., machine tools, gas engines, etc., has filed a report of operations from Nov. 21, 1916, to March 31, 1917. On March 26, the receiver ceased the operation of the machine shop, and since that time has been selling only finished products. The foundry was previously closed.

The Milwaukee Structural Steel Company, Milwaukee, Wis., will build an addition to its plant, 55 x 65 ft., of brick and steel construction.

The Northwestern Bridge & Iron Company, Milwaukee, Wis., will build a steel plant at 27th & Hopkins Streets, the building to be 100 x 180 ft., and to cost \$150,000.

The Racine Motor Truck Company, Racine, Wis., incorporated recently, with a capital of \$50,000, has elected Ira L. Miller president, and B. F. Henline, formerly cashier of the Commercial Bank of Gibbon, Neb., secretary-treasurer. Manufacturing plans are now maturing.

The Greenfield Tap & Die Corporation, Greenfield, Mass., has begun the construction of 45 cottages on Lincoln Street.

Detroit

DETROIT, MICH., May 28, 1917.

Machine-tool makers are marking time. No large orders have been placed, and the miscellaneous total is very small. Manufacturers are holding off until they are sure what their factories will be turned to. It is stated that many of the largest local factories will shortly be manufacturing munitions and jobbers are looking for a large amount of business when Government requirements are known. Business remains very good and automobile factories are working to capacity.

The Marshall Castings Company, Marshall, Mich., is erecting a new plant at South Haven, Mich.

The United States Government will spend \$1,000,000 in constructing and equipping an aviation training station on Lake St. Claire, near Detroit. Work was begun last week on buildings, dormitories, workshops and hangars.

The Oakland Motor Car Company, Pontiac, Mich., is completing the erection of a new engine plant.

The Detroit Weatherproof Body Company, Detroit, has leased five factory buildings in Pontiac, Mich., known as the Flanders group, containing 85,000 sq. ft., and is now moving

its equipment to that city. The executive offices will be maintained in Detroit. Samuel T. Douglas is president.

The Covert Gear Company, Lockport, N. Y., announces plans for a factory in Detroit with an output double that of the one at Lockport. It will specialize on heavy four-piece transmissions. A. A. Gloetznor, manager of sales, service and engineering will have charge of the Detroit factory.

The Detroit Prest-O-Welding & Cutting Company has opened a welding establishment at 548 Clay Avenue. J. L. Van Arsdale and Walter D. Grant are the organizers.

Factory buildings of the Western Carburetor Company, Alma, Mich., are nearly ready for operation, and it is reported the company has orders ahead which will keep it busy throughout the year.

The Automatic Products Company, Detroit, has purchased the three-story factory building at 1145 West Grand Boulevard, containing 54,640 sq. ft. of floor space, for approximately \$125,000. It manufactures solid steel cap screws and other screw machine products and has outgrown its present factory. The Sterling Motor Company, which now occupies the building, has purchased a site and will erect a new plant.

The Elwell Trolley Supply Company, Ann Arbor, Mich., is completing the first unit of its factory, 40 x 200 ft., to be equipped with a brass foundry for the manufacture of trolley frogs, crossings, etc.

The Highgrade Motors Company, Grand Rapids, Mich., will buy a tract of land in the southern part of the city at a cost of about \$15,000, and will erect a brick factory to cost approximately \$22,000.

The Ann Arbor Machine Company, Ann Arbor, Mich., manufacturer of hay presses and silo fillers, is preparing plans for the erection of a new factory to be completed about Aug. 1. A foundry with a capacity for custom work is included in the plans.

The Saginaw Auto Body Company, Saginaw, Mich., has been incorporated with a capital stock of \$100,000, and will start work shortly in the plant formerly occupied by the Feige Desk Company. S. L. Eastman is prominent in the enterprise.

The Saginaw Auto Camp Company, Saginaw, Mich., which will manufacture trailers for automobiles, is completing the erection of a one-story building.

The F. C. Mason Company, St. Johns, Mich., manufacturer of steel frames, is planning to double its plant.

The Desmond Pneumatic Starter Company, Detroit, has been incorporated with a capital stock of \$50,000. The stockholders are John E. Desmond, Nathaniel Victor and Harry Lipshitz.

The Detroit Pulley Company, Detroit, has been incorporated with a capital stock of \$12,000. A. L. Avey, C. W. Edgerton and F. Forney are stockholders.

The Handy Things Company, Ludington, Mich., will enlarge its plant as the result of increased orders. An order was recently received from the Flaray Signal Company, Chicago, for 25,000 electric motor flashers.

The Porter Body Company, manufacturer of commercial bodies, formerly of Ypsilanti, Mich., has moved to the plant formerly occupied by the American Furniture Company, Ann Arbor, Mich.

Cleveland

CLEVELAND, OHIO, May 28, 1917.

Manufacturers of motor trucks and parts and forge shops are getting their plants in shape to take care of a large volume of business to be placed shortly by the Government, specifications for which have been about worked out. Some Government orders for aeroplane forgings and machine work on aeroplane parts have been placed with Cleveland plants. The local machine-tool market is not active, sales the past week being mostly for single machines. Round-lot inquiries for machines for making fuses are still pending. The demand for automatic screw machines in small scattered lots is good. Foreign business has improved. Orders placed the past week include one for 18 automatic screw machines and another for 25 turret lathes for export to England. The National Acme Company, Cleveland, on May 22 advanced prices between 10 and 12 per cent on its automatic screw machines because of the increased cost of production. Locomotive cranes are in active demand from the shipyards and railroads. The call for electric traveling cranes is heavy. The demand for electric tools has been stimulated materially by orders for electric drilling machines for wood boring from new shipyards that will build wooden vessels.

The Cleveland Welding & Mfg. Company, Cleveland, is making additions to its plant. One building providing 50,000 sq. ft. of floor space for making light rims for automobiles is well under way, and the erection of another of about the same size for making bands, has been started. Completion

will be rushed in order to take care of the large line of business growing out of Government orders for war trucks.

The Park Drop Forge Company, Cleveland, is having plans prepared for an addition to its forge shop, and has placed a contract with Arthur G. McKee & Co. for a boiler house, to be equipped with a 1600-hp. Sterling boiler and a Taylor underfeed stoker.

The Scientific Heater Company, Cleveland, manufacturer of hot-water heaters and steam boilers, has acquired the plant of the Cuyahoga Stamping & Machine Company, East 152d Street, near St. Clair Avenue, and is moving into its new quarters, where it will have double its former capacity. Some new equipment has been purchased.

The Supreme Motor Corporation, Cleveland, of which C. F. Jamison is president, has acquired a 22-acre site along the Nickel Plate Railroad, adjoining the plant of the Steel Car Company, and it is announced that the first unit of a manufacturing plant will be erected shortly.

The General Electric Company is having plans prepared for an addition, 85 x 100 ft., to its plant in Cleveland.

The Cuyahoga Machine & Tool Company, Cleveland, has been incorporated with a capital stock of \$10,000 by J. C. Weisenbach and others.

The Sandusky Forge Company, Sandusky, Ohio, recently organized, expects to place its plant in operation about July 1. It was formed by interests connected with the Salisbury Wheel & Axle Company, Jamestown, N. Y., and the Peru Auto Parts Company, Peru, Ind., both makers of automobile axles and wheels, to supply forgings for those two companies. Automobile transmissions will also be made and equipment for manufacturing these is being installed. The company will occupy about 6000 sq. ft. of floor space in the factory formerly occupied by the People's Portland Cement Company. About 12 hammers ranging from 2000-lb. to 7000-lb. capacity, will be installed. R. J. Barrows is president; M. E. Crowe, vice-president; and W. H. Collier, secretary and treasurer.

The Central Mfg. Company, Conneaut, Ohio, has been organized to manufacture toys, and is equipping a factory in the former Tungstolier plant in Conneaut. The officers are G. H. Burke, president; Dewitt C. Baker, vice-president; W. C. Trapp, secretary and general manager; and George Merrill, treasurer. Mr. Burke and Mr. Trapp are president, and secretary and treasurer, respectively, of the Burke Machine Tool Company, Conneaut.

The Chalmers Machine Company, Lima, Ohio, has its new machine shop under way and will shortly place in operation the foundry formerly used by the Power Mfg. Company.

The Fort Smith's Spelter Company, Fort Smith, Ark., has been reorganized, as a result of the purchase by D. W. Kerr of the interest in the company held by the Trumbull Steel Company, Warren, Ohio. The new officers are D. W. Kerr, president and treasurer; F. W. Stillwagon, vice-president and secretary; H. S. Buck, vice-president and general manager. These officers and Loyd Booth, Paul Wick, W. Manning Kerr, and C. W. Finney, constitute the board of directors.

The Electric Rubber & Reclaiming Company, Barberton, Ohio, has purchased considerable new equipment, and will add to its present line of products.

The Jewett Truck Attachment Company, Newark, Ohio, has been incorporated with a capital stock of \$25,000 by William S. Wright and others.

The Schwartz-Van Wormer Company, North Ridgeville, Ohio, has been incorporated by Martin Schwartz, L. N. Van Wormer and others, with a capital stock of \$25,000 to make machinery and tools.

Day & Zimmerman, engineers, 611 Chestnut Street, Philadelphia, are designing a large foundry building for the Toledo Machine & Tool Company, Toledo, Ohio. The plant will be erected on a new site recently acquired and will be employed for the production of castings to be used, it is understood, for the company's service.

Indianapolis

INDIANAPOLIS, IND., May 28, 1917.

The Railway Motor Car Company, Hammond, Ind., will erect an addition to its machine and foundry building to cost \$50,000.

The Logansport Radiator & Equipment Company, Logansport, Ind., is building an addition to its plant.

The Wayne Oil Tank & Pump Company, Ft. Wayne, Ind., has increased its capital stock from \$700,000 to \$1,000,000.

The Globe-Bosse-World Furniture Company, Evansville, Ind., has increased its capital stock from \$750,000 to \$1,000,000.

The Industrial Pattern Works Company, Indianapolis, has been incorporated with \$10,000 capital to make metal and other patterns.

The Michigan Smoke Consumer Company, South Bend, Ind., has been incorporated with \$12,000 capital stock to manufacture smoke consumers. The directors are Henry C. Kleymeyer, J. D. Craft and E. H. Nisbet.

Cincinnati

CINCINNATI, OHIO, May 28, 1917.

Domestic orders for machine tools have lately been booked at a very rapid rate. Most of these are for companies having Government contracts for munitions. The greater part of the orders placed was through the Bethlehem Steel Company. Lathes are in better demand than any other class of machine tools. Makers of wood-working machinery are very busy and a great deal of business is in sight from shipbuilding firms. The high cost of castings, as well as machinery and high-speed steels, has forced advances on all kinds of machinery. Boiler and tank makers are experiencing a dull period. The price of plates is the main reason for the let-up in this line. Manufacturers of small generators and motors are working overtime in an effort to keep up with orders. Portable electric drilling machines are also in excellent demand.

Complaints are made on all sides of delayed railroad shipments. Inbound shipments are invariably late and generally arrive in poor order. This condition has had much to do with delays in delivering machine tools.

The Modern Foundry Company, Oakley-Cincinnati, has commissioned H. M. Lane, Detroit, Mich., to prepare plans for a brick and steel core room addition, 80 x 200 ft., to its plant. None of the equipment has been bought.

The Steel Forging Company, Cincinnati, has been incorporated with \$25,000 capital stock by Thomas B. Morris and others. It is reported, but not confirmed, that the company will erect a forging plant at Oakley.

The Cincinnati Iron & Steel Company, Cincinnati, has commissioned Harry Hake, architect, Cincinnati, to prepare plans for an addition to its plant on West Front Street, principally for warehouse purposes.

The Boyle Engineering Company, Cincinnati, has been incorporated with \$30,000 capital stock by Peyton Boyle and others.

The J. R. Stevens Company, Cincinnati, has secured contract for erecting an addition to the plant of the Wadsworth Watch Case Company, Dayton, Ky., estimated to cost \$40,000.

The broom factory of Timothy Symmes, Hamilton, Ohio, was destroyed by fire last week, entailing a loss of \$5,000. It will be rebuilt at an early date.

The Enterprise Machine Company, Middletown, Ohio, has been incorporated with \$75,000 capital stock by Colin Gardner, Sr., and others. Details are not yet available.

The Malm Machine Company, Dayton, Ohio, has increased its capital stock from \$20,000 to \$100,000 to take care of the growing demand for its punching machines. Axel Malm is president.

The Standard Machine & Tool Company, Dayton, has been incorporated with \$25,000 capital stock by James Saunders and others. Details have not yet been given out.

The North Side Tool Works Company, Dayton, is equipping a brick factory building at 17-19 Maryland Avenue, 45 x 60 ft., two stories.

The Dayton Handle Company, Dayton, suffered a fire loss last week estimated at \$40,000. Rebuilding plans have not yet been given out.

It is reported that the Curtis Door & Sash Company, Clinton, Iowa, will establish a branch plant at Dayton, Ohio.

The Dayton Metal Products Company, Dayton, is making an addition to its plant on Pitts Street, estimated to cost \$63,000.

The Springfield Metallic Casket Company, Springfield, Ohio, has increased its capital stock from \$500,000 to \$1,000,000, and will increase its manufacturing facilities.

The Peters & Herron Dash Company, Columbus, Ohio, maker of automobile specialties, is erecting a two-story brick factory, 60 x 90 ft., on South Gift Street.

The Columbus Wire & Iron Works Company, Columbus, has increased its capital stock from \$30,000 to \$45,000.

The Jewett Truck Attachment Company, Newark, Ohio, has been incorporated with \$25,000 capital stock by William S. Wright and others. Manufacturing plans have not been announced.

It is reported that Remy Brothers, Anderson, Ind., have made arrangements for building a large plant at Kokomo, Ind., to manufacture farm tractors.

The Central South

LOUISVILLE, KY., May 28, 1917.

A big increase in inquiries is reported by local manufacturers of power and ice equipment and plate work, most of them emphasizing the importance of early deliveries. A better tone is shown all around, although needs disclosed are principally imperative ones. The situation as to materials is reported worse than ever, with both the coal and car supplies equally unsatisfactory. Operators in the oil and coal fields are handicapped seriously by the shortage of equipment, although it is stated that some prospective purchasers are held off by the high prices prevailing. Machinist labor is in very large demand, and the local newspapers are full of calls for men from industrial employers in other cities.

The Roy C. Wayne Supply Company, Louisville, Ky., is in the market for a dryer, 6 x 40 ft., and for crushing rolls, 18 x 36 in. in first-class condition.

The Hardinsburgh Electric Light Company, Hardinsburg Ky., has been incorporated by Alfred Taylor, Russell R. Compton and Paul Compton, with a capitalization of \$3,000.

The Hamden Coal & Lumber Company, Jeff, Ky., will install a sawmill at Hamden, Ky., to cost \$4,000. S. J. Snyder is secretary and manager.

The Chickasaw Cooperage Company, Memphis, Tenn., has increased its capital stock from \$30,000 to \$150,000.

The Holston & Liggett Company, Lewiston, Tenn., has been incorporated with a capital stock of \$100,000, and will establish a plant to make cedar slats and lead pencil stock. R. C. Armstrong, Paul Fitzpatrick, W. W. Braden, W. G. Liggett, C. C. Holston are incorporators.

The Robert Scholze Tannery Company, Chattanooga, Tenn., has increased its capital from \$100,000 to \$200,000.

The John G. Duncan Company, Knoxville, Tenn., is in the market for two 6 x 8-in. steam hoisting engines and boilers, with winches complete.

The Hegan-Magruder Company, Louisville, Ky., has been incorporated with a capital stock of \$35,000 by James E. Hegan, W. C. Magruder and E. C. Hall to manufacture mantels, stoves, hardwood floors, etc.

Birmingham

BIRMINGHAM, ALA., May 28, 1917.

Inquiry for machine tools in iron-working establishments is quite active, and second-hand machinery has exchanged hands quite liberally. All dealers are behind on deliveries. The general tone of the trade is one of satisfaction.

The Southeast Alabama Power Company, Columbia, Ala., has begun the erection of a hydroelectric plant, which is planned to develop 5000 to 10,000 hp.

The National Pipe & Foundry Company, Attalla, Ala., will double capacity of its steam-fittings department.

The J. B. McCrary Company, Atlanta, Ga., is drawing plans for a waterworks system for Lineville, Ala., to cost \$25,000.

St. Louis

ST. LOUIS, MO., May 28, 1917.

Machine-tool dealers, while the business closed has not shown any very large increase, have been busy preparing estimates and other information for expectant purchasers against the time when the readjustment of business assumes more definite shape and there is more complete knowledge of what is wanted. A better feeling is noted regarding the coming demand which it is expected will be of large volume.

The Fulton Iron Works, St. Louis, which recently increased its capital stock and is planning large extensions, has changed its name to the Fulton Machine Company.

The Manchu Storage Battery, incorporated in Delaware, for \$300,000, has been authorized to utilize \$140,000 for a plant in St. Louis.

The United Mfg. Company, St. Louis, has been incorporated with a capital stock of \$15,000 by W. F. Byrnes, C. R. Baldwin and W. L. Cumiskey to manufacture electrical equipment.

The Clenzall Machines Company of America, St. Louis, has been incorporated with a capital stock of \$60,000 by F. H. Ehnts, Philip B. Fouke and Albert M. Ahern to manufacture cleaning, washing and dyeing machinery.

The B. V. Brick Company, Kansas City, Mo., has been incorporated with a capital stock of \$115,000 to manufacture brick and clay products. The stockholders are W. C. Root, George V. Lewis and Walter Brown.

The plant of the Macon Motor Company, Macon, Mo., which was burned with a reported loss of \$350,000, will probably be re-equipped. Decision is to be made shortly.

The Earle Compress Company, Earle, Ark., has been incorporated with a capital stock of \$50,000 by F. W. Reisinger, N. A. Kramer and H. A. Morrison.

The Hoxie-Walnut Ridge Compress Company, Hoxie, Ark., has been incorporated with a capital stock of \$50,000 by S. C. Dowell, W. A. Dowell and S. E. Spikes. A power plant will be installed.

The Shoemaker-Bale Auto Company, Little Rock, Ark., will enlarge its machine shop to three times its present capacity and is in the market for equipment.

Sam E. Myar, 124 East Twenty-fourth Street, Little Rock, Ark., has organized a company to manufacture automobile accessories and equipment. Machinery to cost about \$10,000 will be installed.

Malvern, Ark., G. E. Matteson, chairman of the improvements board, will issue \$124,000 in bonds for the equipment of a waterworks station and other municipal plants.

The Myers Stave & Mfg. Company, Piggott, Ark., has increased its capital from \$50,000 to \$100,000 to extend its operations.

The Altus Farmers' Co-operative Gin Company, Altus, Okla., has been incorporated with a capital stock of \$25,000 by J. A. Morgan, A. A. May and Winfield Briscoe.

The subsidiaries of the Doherty Operating Company, 60 Wall Street, New York, will extend its pipe-line and oil-pumping equipment and also enlarge its plants.

The McComb & Magnolia Light & Railway Company, A. H. Jones, general manager, Fernwood, Miss., will equip a power plant and is now in the market for machinery.

The Goodyear Yellow Pine Company, Picayune, La., will equip a sawmill with a daily capacity of 300,000 ft., also a paper mill and wood reduction plant.

The Gulfport Shipbuilding Company, Gulfport, Miss., has been incorporated with a capital stock of \$50,000 by Rapp Reynolds, R. Quinn, W. J. Faust and others.

The L. N. Dantzer Lumber Company, Moss Point, Miss., will equip a shipbuilding plant.

The United Oil Refining Company, Lake Charles, La., J. R. Aiken, treasurer, is receiving bids for oil refinery equipment of about 1000 bbl. per day capacity.

Ernest Lee Jahnke, Madisonville, La., will equip a shipbuilding plant, the capacity to be determined.

The Star Shipyards, New Orleans, La., has been incorporated by Walter Cook Keenan, H. M. Field and Crawford Ellis and will install electric cranes, pneumatic machinery and other equipment.

The W. R. Pickering Lumber Company, Kansas City, Mo., will install sawmill machinery at Pickering, La., with a daily capacity of 150,000 ft.

The General Automatic Scale Company, St. Louis, has been organized with a capital of \$100,000 by Henry C. Schaper, Richard Scheld and William J. O'Day.

Texas

AUSTIN, TEX., May 26, 1917.

Machinery and equipment that enter into shipyards and the building of wooden vessels promises to be in large demand as a large number of plants of this character are to be established at ports on the coast of Texas. Industrial conditions in Mexico are said to be improving.

The D'Artois Refining Company, Houston, has opened offices preparatory to constructing a large oil refinery on the ship channel near there.

J. N. McCammon, Pine Bluff, Ark., has purchased a site at Beaumont for a shipbuilding plant. He has obtained contracts from the Government for six wooden ships.

The Seaboard Transportation & Shipping Company, Galveston, is preparing plans for the construction of shipbuilding yards and marine ways.

J. P. McDonough, Galveston, has taken steps to build a shipbuilding plant.

The Magnolia Petroleum Company, Beaumont, has purchased a site adjoining its refinery, upon which it will build an addition.

The Wills Point Gin Company will build a cotton gin at Wills Point at a cost of about \$8,000. C. N. Thatcher is in charge.

The Tarver Ship Building Corporation will enlarge its shipyard at Beaumont for the construction of wooden vessels.

The Beaumont Ship Building & Dry Dock Company, Beaumont, is preparing for the construction of a shipbuilding plant. The company has a capital stock of \$250,000. J. W. Lind of

Houston is president. It has the contract to build 20 wooden schooners for the Kirby Lumber Company.

The McBride Law Ship Building Company, Beaumont, has awarded the contract for building a shipyard on a site of about 14 acres on the east side of the Neches River.

The Interlocking Cement Stave Silo Company, Odessa, has been incorporated with a capital stock of \$6,000 and will build a plant for the manufacture of cement silo staves. W. H. Rhodes is one of the promoters.

The Gulf Colorado & Santa Fe Railroad has paid a monthly appropriation of \$388,947 for improvements to the right-of-way, shops and engine houses, stations, etc.

Plans are on foot at Plainview for the construction of a beet sugar factory to cost about \$1,500,000. Col. R. P. Smyth, Plainview, is prominent in the company.

The Lone Belt Lumber Company, Kansas City, Mo., has leased land at Port Arthur from the Kansas City Southern Railway, upon which it will build a shipyard.

The Lone Star Ship Building Company, Beaumont, is filling in a site and constructing the foundations for a shipbuilding plant.

California

LOS ANGELES, CAL., May 22, 1917.

The Santa Fe Railway Company, Los Angeles, is having plans prepared for extensions to its locomotive and car works at San Bernardino. The work will include a blacksmith shop, 45 x 400 ft.; a car repair shop, 45 x 400 ft.; and a refrigerator car repair building, 46 x 1200 ft. A one-story storage plant, 65 x 300 ft., equipped with electric traveling crane, will also be constructed. G. W. Harris, Kerckhoff Building, Sixth and Main Streets, is chief engineer.

The Republic Motor Truck Company, Alma, Mich., is considering the erection of a plant at Los Angeles for assembling work. The first unit of the proposed factory is estimated to cost about \$150,000, and will give employment to about 250 workmen. D. F. Poyer of the D. F. Poyer Truck Company, local distributor, is said to be arranging for a site.

The Pacific Electric Railway Company, Pacific Electric Building, Los Angeles, will build a temporary shop, 80 x 200 ft., to be equipped for car work while the permanent shop buildings at Torrance are being erected. M. C. Halsey is superintendent of construction.

The George R. Bentel Company, Los Angeles, local representative for automobiles, is building a four-story building containing about 65,000 sq. ft. floor space on Grand Street, for its mechanical departments. It will include departments for manufacturing parts, service and repair work, with enameling ovens, metal-plating equipment, etc.

The Willys-Overland Company, Fresno, Cal., has arranged for the construction of a new automobile service building on Van Ness Avenue, to cost about \$65,000. The structure will be three stories, 100 x 150 ft., and will be equipped for machine and general repair work. Frank G. Hood is local manager.

The Oliver Mfg. Company, Oakland, Cal., has been organized and will commence at once the construction of a plant to cost about \$500,000. It will be equipped with lathes, traveling cranes and similar machinery for the manufacture of products for plants which have not facilities for handling their large orders. William Letts Oliver is president.

The Pacific Northwest

SEATTLE, WASH., May 22, 1917.

It is expected that the Government will shortly begin buying lumber on a big scale, and as cars will then be provided a new era of prosperity is looked for in the lumber industry. The present demand for wooden hull shipbuilding has been a tremendous stimulant. An advance of \$1 has been made in lumber, placing the market at its highest point in 10 years. The advancing prices of supplies and wages will, it is believed, result in a further advance. Railroads are giving preference to the movements of wheat east, which has further hampered the car situation. It is authoritatively stated that stocks of lumber on hand in Northwest mills, which have been sold but cannot be moved, represent \$10,000,000 in value.

According to figures recently compiled for representatives of the Northwest shipping interests in Washington, D. C., the shipbuilding yards of Puget Sound and Grays Harbor can deliver 180 ships per year when the yards are expanded. The mills of the district have announced that they can furnish lumber for 340 ships per year. These figures do not take into account new yards projected or under construction, which would add at least 45 ships to this number.

Seattle's water-borne commerce for the first four months of the year averaged \$1,200,000 per day, compared with \$950,000 per day for 1916.

The Portland Galvanizing Works, Portland, has been incorporated with a capital stock of \$25,000 to engage in galvanizing and tinning. The incorporators are Martin Eliser, Joseph Supple and Fred A. Ballin.

The Steel Lock Concrete Construction Company, Pittsburgh, Pa., has established a Western branch office in the New York Building, Seattle, in charge of Martin Korstad and J. B. Hill.

A new shipbuilding company named Frank Oleson & Sons, Inc., Seattle, has been incorporated with a capital stock of \$100,000. The company has leased a site on the Duwamish Waterway, where it will construct a shipyard for wooden vessels.

Barbare Brothers, shipbuilders, Tacoma, Wash., plan to enlarge their plant, adding several ways.

The Hoquiam Shipbuilding Company, Hoquiam, Wash., has started the construction of its wooden shipbuilding plant. F. G. Foster is president.

Charles Widrig, Seattle, and associates, has taken a site at Raymond, Wash., for a shipyard for constructing wooden ships.

The Sloan Shipbuilding Company, Olympia, which recently purchased the Pioneer Iron Works of that city, plans to expend \$40,000 in enlarging the plant. Improvements will provide for the manufacture of triple-expansion engines, which will allow the shipbuilding company to manufacture complete vessels.

The Sandstrom Shipbuilding Company, Seattle, has closed contracts for two 3000-ton wooden ships, costing \$600,000, of twin-screw type, each equipped with two 500-hp. heavy oil-burning engines.

The Spokane Corrugated Culvert & Tank Company, Spokane, Wash., plans to double the capacity of its factory, and expand its lines of manufacture. Another building, 100 x 100 ft. will be constructed, and machinery valued at \$20,000 will be installed. C. A. Mowry is general manager.

The United Shipbuilding Company, Seattle, has been incorporated and has purchased a \$50,000 site for a wooden shipbuilding plant. The company holds five contracts.

Frank Waterhouse, Inc., Seattle, has purchased a block of tidelands in that city and plans the immediate construction of an overseas shipping terminal, estimated to cost \$500,000. Plans provide for a 1000-ft. wharf and warehouse, 150 x 1000 ft.

The American Shipbuilding Company, Spokane, Wash., has completed plans for its proposed shipbuilding plant at Warrenton, Ore., to cost \$400,000 and to provide three ways.

The Northwest Lead Company, manufacturer of lead pipe, sheet and specialties, has moved its plant from Portland, Ore., to 1742-46 Fourth Avenue South, Seattle, where a new factory has been built. New equipment will be installed, including a 60-ton sheet-lead mill.

The Hendricks Mfg. Company, Seattle, is having plans prepared for a machine shop, 100 x 128 ft., to be equipped with traveling crane, etc.

The Pacific Shipbuilding Company, San Francisco, newly organized with a capital of \$250,000, has taken over a shipyard in Bandon, Ore., and will immediately start operations.

The Griswold-O'Donnell Company, Portland, Ore., has been incorporated for \$5,000 and will construct a shipyard in Portland. The incorporators are G. A. Griswold, M. J. O'Donnell and C. M. Enbanks.

The United Shipbuilding Company, Seattle, has been incorporated to erect a shipyard at Charleston, Wash., for wooden ships. It holds contracts for five ships.

The Crawford & Doherty Foundry Company, Portland, Ore., has recently completed the equipment of a plant at 924 East Seventeenth Street to specialize on architectural iron castings, etc. C. F. Doherty is president, V. O. Stirnweis is secretary and treasurer and H. R. Crawford is vice-president.

The Tacoma Shipbuilding Company, Tacoma, Wash., plans to enlarge its plant to permit of the construction of 6 wooden-hull vessels of 3000 tons capacity each. The company is capitalized at \$300,000. The plant will have a working capacity of 12 ships per year.

The Northern Pacific Railroad Company will expend more than \$250,000 in improvements to its yards at Laurel and Billings, Mont.

The Capital City Iron Works, Olympia, Wash., will construct a two-story building to extend its machine shops to handle job work and specialties. The erecting plant will be on the first floor, and the second floor will be used for pattern room and storeroom. The company is at present constructing machinery for the Sloan Shipyards. H. H. Piper is manager.

The Seattle Machine Works, Seattle, is devoting its entire shop to the manufacture of marine machinery for wooden-hull ships, including heavy marine engines, dredging machinery. A 2700-hp. marine engine is now under construction for a local shipyard. It has recently made extensive improvements and now plans the erection of a plant on the Duwamish Waterway, where it has secured a site. Erick Johnson is president.

Canada

TORONTO, ONT., May 27, 1917.

The William Davies Company, 521 Front Street East, Toronto, will build an addition to its boiler house to cost \$6,000.

The Canadian Leatherboard Company, Chambly Canton, Que., has awarded a contract for a \$250,000 factory.

Louis Lavoie, 134 Queen Street, Quebec, will build an electric and machine shop to cost \$10,000. Gasoline tank and other equipment is required.

W. J. Hickey, 91 Main Street East, Welland, Ont., has been awarded the contract for an electrode building for the Electro Metals, Ltd., at Welland, to cost \$40,000.

The entire plant of the Copp Stove Company, Fort William, Ont., was destroyed by fire, May 23, with a loss estimated at between \$350,000 and \$500,000.

Work has been started on transforming the old Customs Building at Cobourg, Ont., to be used as a factory for the Bird-Archer Company, 90 West Street, New York, which is establishing a plant there. The company will manufacture boiler supplies, etc.

The Electric Appliances, Ltd., Hamilton, Ont., have been incorporated with a capital stock of \$50,000 by John F. Radigan, George G. Sutherland, Thomas D. Fallon and others to manufacture electric stoves, heaters, furnaces, etc.

The Pacific Shipbuilding Company, Ltd., Vancouver, B. C., has been incorporated with a capital stock of \$50,000 by James C. Shields of Vancouver, B. C., John T. Robinson, Kamloops, B. C., Alexander Smith, William Johnston of Ottawa and others, to build boats, ships, etc.

The Dominion Foundries & Steel, Ltd., Hamilton, Ont., has been incorporated with a capital stock of \$6,000,000 by Edward H. Ambrose, Henry A. Burbidge, John R. Marshall and others to take over the business now carried on by the Dominion Steel Foundry Company.

Davidson, Sask., proposes to spend \$4,500 on additions to power house and \$4,300 on purchase of engine and electrical equipment, etc.

The Elmira Machinery & Transmission Company proposes to build a plant at Elmira, Ont., and is asking the town for a loan of \$15,000.

The Phonola Company of Canada, Elmira, Ont., recently incorporated to manufacture talking machines, etc., proposes to establish a plant at Elmira.

Fire caused \$250,000 damage at the plant of the National Electrolytic Company, Niagara Falls, Ont., May 19.

The Canadian Flexible Skate Company, Ltd., Parry Sound, Ont., has been incorporated with a capital stock of \$100,000 by Carl L. Falstrom, John A. Bragg, Milton H. Limbert and others to manufacture skates, etc.

George W. Ecclestone, Ltd., Bracebridge, Ont., has been incorporated with a capital stock of \$40,000 by John G. MacDiarmid, William J. Stubbs, Charles E. Lount and others, to manufacture hardware, fixtures, etc.

The Movette Camera Corporation of Canada, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Robert L. Zien, Vancouver, B. C.; Florence A. Sweet, Anna McCartney and others of Toronto, to manufacture moving picture cameras, etc.

Government Purchases

WASHINGTON, D. C., May 28, 1917.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until June 5, schedule 1163, for three 3-ton and 5-ton capacity self-supporting jib cranes for Philadelphia; schedule 1164, for two Diesel engine-driven generating sets, schedule 1165, for one 800-ton high-speed forging press and two 150-ton hydraulic forging presses, all for Norfolk; schedule 1166, for one plate-bending machine and flanging rolls for Philadelphia; schedule 1167, for two hollow hexagon universal turret lathes and one motor-driven hobbing machine for worm wheels, all for Boston; schedule 1168, for three 2-ton battery crane trucks, schedule 1169, for one vertical spindle universal boring machine, one hollow chisel vertical mortiser and four wood bench trimmers, all for Washington; schedule 1184, for miscellaneous electrical

rammers, powder hoists, shell hoists, etc., for Washington; schedule 1186, for 14 complete furnaces and blowers for Philadelphia and Norfolk.

The depot quartermaster, El Paso, Tex., will receive bids until 2 p. m. June 14, for new electrical and pumping equipment for the pumping station at Fort Bliss, Tex.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, May 22, for supplies for the naval service as follows:

Schedule 1092, Construction and Repair—Class 132, Norfolk—Forging press—Bid 13, \$15,000 and \$22,000; 35, \$17,500; 126, \$14,535.

Schedule 1108, Steam Engineering—Class 201, Philadelphia—Engine lathe. Bid 19, \$1,309.50, \$1,379.50, \$1,478.50, and \$1,558.50; 41, units; 42, units; 67, \$1,809; 71, \$1,165; 81, \$2,120; 89, \$1,600; 113, \$1,706; 131, \$1,821.60; 150, \$1,778, \$1,745, \$1,555, and \$1,520.

Class 202 Philadelphia—Crank shaper. Bid 41, units; 67, \$1,402; 81, \$1,000; 89, \$1,525; 113, \$1,567; 150, \$1,263 and \$1,244.

Class 203, Philadelphia—Upright drill. Bid 41, units; 58, \$402; 89, \$772; 113, \$810; 150, \$645, \$635, and \$450.

Class 204, Philadelphia—Double grinder. Bid 27, \$214.50; 41, units; 71, \$179; 81, \$220; 150, \$193.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

Bid 13, Bethlehem Steel Company; 19, Carroll Electric Company; 27, James Clark, Jr., Electric Company; 35, M. W. Pruten Company; 41, Fairbanks Company; 42, Flather & Co., Inc.; 58, Hoefer Mfg. Company; 67, Intercontinental Machinery Corporation; 71, Kemp Machinery Company; 81, Manning, Maxwell & Moore, Inc.; 89, Niles-Bement-Pond Company; 113, W. E. Shipley Machinery Company; 126, United Engineering & Foundry Company; 131, Vandyck-Churchill Company; 150, D. Nast Machinery Company.

NEW TRADE PUBLICATIONS

Grey-Iron Castings.—Stroh Casting Company, Chene and Guoin streets, Detroit. Refers to the facilities of the company for the production of grey-iron castings in large quantities. A number of views of the plant supplement the description of the structures and their equipment. Portraits and brief sketches of the heads of the various departments are included.

Wiping Waste.—Royal Mfg. Company, Rahway, N. J. Booklet entitled "Producing the Fittest in Waste." Gives a pithy comprehensive comparison of the cotton waste formerly used in manufacturing plants with that employed at the present time, the text being supplemented by a number of photographs illustrating the methods employed in refining this product.

Electric Tools and Flexible Shafting.—Stow Mfg. Company, Binghamton, N. Y. Two miniature bulletins. The first, No. 101, is devoted to a line of electric tools, which includes drilling machines of various types, portable buffing and grinding machines, general utility tools and several types of grinding machines. A single page is given to each tool with an engraving, brief description and condensed specification table. The other bulletin, No. 102, illustrates and describes varied applications of flexible shafting to portable grinding, boring and drilling machines. Views of the tools to which the shafting has been applied are presented, including a number of illustrations of the machines in actual use.

Handling and Power Transmission Equipment.—Oliver J. Abell, 565 Washington Boulevard, Chicago. Pamphlet. Enumerates a line of high-speed transmission and other types of drive chain; pressed steel shafting hangers, pulleys and roller bearings; cranes, hoists and trolleys; one-man detachable tongue industrial trucks, malleable iron and steel buckets, a single-line grab bucket and furnace charging and ash handling equipment. Accompanying the pamphlet is a standard index card designed for the file of the purchasing agent.

Silent Chain Drive.—Link-Belt Company, Thirty-ninth Street and Stewart Avenue, Chicago. Booklet No. 253, entitled "The Ideal Drive for Cement Mills." Mentions an installation of the company's silent chain drive at the plant of the Nazareth Cement Company. There are 32 of these drives ranging from 35 to 150 hp. each and totaling 3500 hp. A brief description of the severe operating conditions encountered, such as widely varying loads and the absorption of vibration caused by the unbalanced action of the driven units, are briefly commented upon. A number of illustrations of the different drives are presented, supplemented by a brief description of the chain.

ESTABLISHED 18

A No



A NOTHER worthy New England building of the Winding Company, Providence. The frame castings will be in the form of the somewhat irregular by the design of highly specialized fabrication and a work. The plan of this examination of New England and Booth, general superintendent, construction engineer, equipment, Charleston, is responsible.



Fig. 1—A Cons